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ggtgtatactccatacaatcagaagttcaaggcagggccacactgtactgttagacaaatccctcagcacagccatcgccatgcagctcg
cagccgtgacatctgaagactctgcggctattctgtcaagagtgggtactatagtaactcttactgttacttcgatgtctggggcac
agggaccacggtcaccgtctctgtatccaactctgaagaagcaaagaaggaggccaaaaggaggaagccaaga
aatctaacagcgtcgacattgttctgactcagttccagccaccctgtctgtactccaggagatagactctcttcctgcaggccc
5 acccagagtattagcgactacttacactggtatcaacaaaaatcacatgagtccaaaggctctcatcaaataatgctccatccatc
tctggatccccccctccaggttcaglggcagtggatcagggcagattcactctcagtatcaacagtgttgaacctgaagatgttggaa
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caggatctctgcaggccttggatgcctcacaactactggaatgcgttgcagatccaggaaagggttgaagt
10 ggattggctggataaacacccacttggagtgccaaaatatgtagaagactcaaggacggttgcctctcttggaaacccctcg
caacactgcataattacagataagcaacccaaagatgaggacacggctacgtttctgttgcagatccggaaatggtaactatga
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ccacccgtccccagcacctgaactcctgggggatcgtcagttctcttcccaaaacccaaaggacaccctcatgtatcccg
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15 ggtgcataatgccaagacaaagccgcggaggaggcagttacaacacgcacgtaccgtgtggcagcgtccaccgtctgcacca
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caaagggcagccccgagaaccacaggttacaccctggggatgagctgaccaagaaccaggcgtaccgt
gcttggcgtcaaaaggcttatcccgacatcgccgtggagttggagagcaatggcagccggagaacaactacaagaccacg
cctcccggtgtggactccgacggccttcccttacagcaagctcaccgtggacaagagcaggtggcagcagggaaacgtt
20 tctcatgtccgtgtatgcgtgaggctgtcgacaaccactacacgcagaagacccctccctgtctccgggaaatgtatcaga

2H7-antiCD40 scFv MTH (SSS) MTCH2WTCH3 (2H7-40.2.220Ig) (amino acid sequence) (SEQ ID NO:)

25 MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWIYAPSNLASGVPARFSGSGSGTYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKGGGGGGGGGGGGSSQAYLQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYNSYWYFDVWGTGTTVSSDQSNSEEAK
KEEAKKEEAKKSNSVDIVLTQSPATLSVTPGDRVSLSCRASQSISDYLHWYQQKSH
30 ESPRLLIKYASHSISGIPSRFGSGSGSDFTLSINSVEPEDVGIYYCQHGHFPWTFGG
GTKLEIKRGGGGGGGGGGGGGSQIQLVQSGPELKPGETVRISCKASGYAFTTG
MQWVQEPMGKGLKWIGWINTPLWSAKICRRLQGRFAFSLETSANTAYLOISNLKD

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EDTATYFCVRSGNGNYDLAYFAYWGQGTLVTVSDQEPKSSDKTHSPPSPAELL
GGSSVFLPPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAIEKTISKAKGQPREG
PQVYTLPPSRDELTQNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPVLDSD
5 GSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

5B9 VH (includes the VH leader peptide) (nucleotide sequence) (SEQ ID NO: ____)

atggctgtctggggctgctctgcctggtagacattccaagctgtgtcctaaccaggcaggctggcc
tagtgcagtccacacagagcctgtccatcacctgcacagtctctggttctcattaactacctatgctgtacactgggtcggccagtctc
10 caggaaagggtctggagtggtggctggagtgatatggagtggtagatcacagactataatgcagcttcataatccagactgagcata
accaaggacgattccaagagccaagttttaaaatgaacagtcgtcaacctaatgacacagccatttattactgtgccagaaatg
gggtgataactacccttattactatgctatggactactgggtcaaggAACCTCAGTCACCGTCCTCA

5B9 VH (minus the leader) (nucleotide sequence) (SEQ ID NO: ____)

15 caggtgcagctgaaggcaggcaggccatggcttagtcgtccacagaggctgtccatcacctgcacagtctctggtttcataat
actacctatgctgtacactgggtcgccagtcctcaggaaagggtctggagtggtggatggagtggtggaaatcacaga
ctataatgcagttcatatccagactgagcatcacaaggacgattccaagagccaagttttaaaatgaacagtcgtcaacctaa
atgacacagccatttattactgtgccagaaatgggtgataactacccttattactatgctatggactactgggtcaaggAACCTCAGTCACCGTCCTCA

20

5B9 VH (includes leader peptide) (amino acid sequence) (SEQ ID NO: ____)

MAVLGLLFCLVTFPSCVLSQVQLKQSGPGLVQSSQSLISITCTVSGFSLTTYAVHWV
RQSPGKGLEWLGVIWGGITDYNAAFISRLSITKDDSKSQVFFKMNSLQPNDTAIY
YCARNGGDNYPYYYAMDYWGQGTSVTVSS

25

5B9 VH (no leader peptide) (amino acid sequence) (SEQ ID NO: ____)

QVQLKQSGPGLVQSSQSLISITCTVSGFSLTTYAVHWVRQSPGKGLEWLGVIWGGI
TDYNAAFISRLSITKDDSKSQVFFKMNSLQPNDTAIYYCARNGGDNYPYYYAMDY
WGQGTSVTVSS

30

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5B9 VL (nucleotide sequence) (SEQ ID NO:____)

atgagggttcctgtcagctctggggctgtgtgcctggatccactgcagataattgtgtatgcaggcattc
caatccaggcactcttggAACATCAGCTTCCATCTCCTGCAGGCTAGTAAGAGTCCTACATAGTAATGGCATCACTATTGTATTGG
tatctgcagaAGGCGAGGCCAGTCCTCAGCTCTGATTTCAGATGTCCAACCTGCTCAGGAGTCCCAGACAGGTTAGTAGCA
5 gtgggtcaggaactgattcacactgagaatcagcagagtggaggctgaggatgtgggtttattactgtgtcaaaatctagaact
tccgctcacgttcggcgtggaccaagctggagctgaaacgg

5B9 VL (amino acid sequence) (SEQ ID NO:____)

MRFSAQLLGLLVWIPGSTADIVMTQAAFSNPVTLGSASISCRSSKSLLHSNGITY
10 LYWYLQKPGQSPQLLIYQMSNLASGVPDFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKRGGGGGGGGSSQVQLKQSGPGLVQSSQSLR

5B9 scFv (nucleotide sequence) (SEQ ID NO:____)

aagcttgcgcattgagggtctgtcagctctggggctgtgtgcctggatccactgcagataattgtgtatgcacca
15 ggctgcatttccaatccaggcactcttggAACATCAGCTTCCATCTCCTGCAGGCTAGTAAGAGTCCTACATAGTAATGGCATCA
CTTATTGTTATGGTATCTGCAGAAGGCCAGGCCAGTCCTCAGTCCTGATTTCAGATGTCCAACCTGCTCAGGAGTCCCAGACA
GGTTCACTGAGTCAGTGGGTAGGAACTGATTTCACACTGAGAACATCAGCAGAGTGGAGGCTGAGGATGTGGGTATTACTGTGCTC
AAAATCTAGAACCTCCGCTCACGTCGGTCTGGGACCAAGCTGGAGCTGAAACGGGGTGGCGGTGGCTGGCGGGGGTGGGTGGGT
20 CGGGTGGCGGGCGGATCGTCACAGGTGCAAGCAGTCAGGACCTGCCAGTCAGTCCTCACAGAGCCTGTCATCACCT
GCACAGTCCTGGTTCTCATTAACTACCTATGTCAGTACACTGGGTCGCCAGTCAGTCAGGAAAGGGTCTGGAGTGGCTGGGAGTGT
ATGGAGTGGTGAATCACAGACTATAATGCACTTCAATCCAGACTGAGCATCACCAAGGACGATTCCAAGAGCCAAGTTTCTT
AAAATGAACAGTCAGTCACACAGCCATTATTACTGTGCCAGAAATGGGGGTGATAACTACCCTTATTACTATGCTATGGA
CTACTGGGTCAAGGAACCTCAGTCACCGTCCTCT

25 5B9 scFv (amino acid sequence) (SEQ ID NO:____)

MRFSAQLLGLLVWIPGSTADIVMTQAAFSNPVTLGSASISCRSSKSLLHSNGITY
LYWYLQKPGQSPQLLIYQMSNLASGVPDFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKRGGGGGGGGSSQVQLKQSGPGLVQSSQSLR
ITCTVSGFSLTTYAVHWVRQSPGKGLEWLGVISGGITDYNAAFISRLSITKDDSK
30 SQVFFKMNSLQPNDTAIYYCARNGGDNYPYYYAMDYWQGQTSVTVSS

5B9 scFv-hmtIgG1-hCD80 (nucleotide sequence) (SEQ ID NO:)

aagcttgcgcgcattaggctctgctcagttctggggctgtgtggatccactcgacatatttgtatgc
ggctgcatttcacatccaggactcttggaaacatcagttccatctcctgcaggcttagtaagactctccatataatggcatca
5 ctatgttattgttatctgcagaagccaggccagtcctcagtcctgttattcagatgtccaaacctgcctcaggagtcccagaca
ggtcagtagcagtggtcaggaactgattcacactgagaatcagcagagtgaggatgtgggtgttattactgtgct
aaaatctagaacitccgctcacgttcgggtctggaccagctggagctgaaacggggggccgggtggctggccgggtgggtgggt
cggtggccggatcgtcacaggtcagctgaagcagtcaggacctggcttagtgcagtcctcacagagcctgtccatcac
gcacagtcctgtttctcattaactacctatgttacactgggtcgccagtcagaaagggtctggagtggtggagtgt
10 atggagtggtaatcacagactataatgcagcttcataatccagactgagcatccaaggacgattccaagagccaagtttctt
aaaatgaacagtctgcaacctaatafcacacagccatttattactgtgccagaaatgggggtataactacccttattactatgtatgg
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cagcacctgaactcctgggggatcgtcagtcctcttccccccaaaacccaaggacccctcatgtctccggaccctgag
gtcacatgcgttgtggacgtgagccacgaagaccctgaggtaagttcaactggtagtgcgtggacggcgtggaggtgcataat
15 gccaagacaaaagccgcggaggaggcagttacaacacagcacgtaccgtgtggcagcgtctcaccgtctgcaccaggactgg
gaatggcaaggaglacaagtgcaggctccaacaaagccctccagccccatcgagaaaaccatctccaaagccaaaggcc
agcccccagaaccacagggtacaccctgccccatccggatgagctgaccaagaaccaggcgtaccgtaccgtccgtca
aaggcttctatccagcgacatgcgtggagtggtggagagcaatggcagccggagaacaactacaagaccacgcctccctg
ctggactccgacggctcttcctctacagcaagctcaccgtggacaagagcagggtggcagcagggaaacgtctcatgc
20 cgtgtgcatgaggctctgcacaaccactacacgcagaagagccctccctgtctccggtaaagcggatcctcgaacctgc
catcctggccattaccctaatctcagtaatggattttgtatgtgcctgaccctactgccttgccccaaagatgcagagagaga
aggaggaatgagagattggagaagggaaagtgtacgcctgtataaattcgatactcgag

5B9 scFv-hmtIgG1-hCD80 (amino acid sequence) (SEQ ID NO:)

25 MRFSAQLGLLVWIPGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLLHSNGITY
LYWYLQKPGQSPQLLIYQMSNLASGVPDFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKRGGGGGGGGGGGGGSSQVQLKQSGPGLVQSSQSL
ITCTVSGFSLTTYAVHWVRQSPGKGLEWLGVWSGGITDYNAAFISRLSITKDDSK
SQVFFKMNSLQPNDTAIYYCARNGGDNYPYYYAMDYWQGQTSVTVSSDLEPKSS
30 DKTHTSPPSPAPELLGGSSVFLFPPPKDKTLMISRTPEVTCVVVDVSHEDPEVKFNW
YVDGVEVHNNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPA
PIEKTISKAKGOPREPOVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGOP

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ENNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLS
LSPGKADPSNLLPSWAITLISVNGIFVICCLTYCFAPRCRERRNERLRRRESVRPV

2e12 scFv WTH CH2 CH3 (2e12 scFv-WthIgG-CD80) (nucleotide sequence) (SEQ

5 **ID NO: ____**

aagcttaatggatttcaagtgcagatttcagttcctgtataatcagtgcgttcagtcataatgtccagaggagtcgacattgtgtcaccc
aatctccagttcttggctgtgtcttaggtcagagagccaccatctcctgcagagccagtgaaagtgttgaatattatgtcacaagtt
taatgcagtggtaccaacagaaccaggacagccacccaaactcctcatctgtgtcatccaacgtagaatctgggtccctgcc
aggtttagtggcagtgggtctggacagacttcagcctcaacatccatcctgtggaggaggatgtcaatgtattctgtcagc
10 aaagttaggaaggittcggacgttcggtgaggcaccaagctggaaatcaaaccgggtggcggtggctggcgagggtgg
tcgggtggcgccgatctcaggcgtcagctgaaggactcaggacctggcctgtggccctcacagagcctgtccatcacatgc
accgtctcagggttctcaitaaccggctatggtaaaactgggtcgccagccctccagggaaagggtctggagtggctggaaatgat
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aaaaatgaacagtctgcaaaactgtacacagccagataactgtgccagagatggtagtaactttcattactatgttatggact
15 actggggtcaaggaaacctcagtcaccgttcctcagatctggagccaaatctgtgacaaaactcacacatccccaccgtgc
gcacacctcgtgggggaccgtcagtcttcctttcccccääaccacggacaccctcatgtatcccgaccctgaggt
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caagacaagccggggaggaggcgtacaacacgcacgtaccgtgtggcagcgtcctcaccgtctgaccaggactggctga
atggcaaggaggtaactgtcaagggtctccaacaaaggccctccagccccatcgagaaaaccatctccaaagccaaagg
20 ccccgagaaccacaggtgtacaccctgccccatccggatgagctgaccaagaaccaggtcagcctgacctgcctggtaaa
ggctctatccagcgcacatcgcgtggagtggagagcaatggcagccggagaacaactacaagaccacgcctccgtct
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atccctggccattaccctaatctcagtaatggaaattttgtatgtcctgacctactgtttgccccaaagatgc
25 ggaggaatgagagattgagaaggaaagtgtacgcctgtataaatcgat

2e12 scFv WTH CH2 CH3 (2e12 scFv-WthIgG-CD80) (amino acid sequence) (SEQ

ID NO: ____

MDFQVQIFSFLISASVIMSRGVDIVLTQSPASLA VSLGQRATISCRASESVEYYVTS
30 LMQWYQQKPGQPPKLLISAASNVESGPARFSGSGSGTDFSLNIHPVEEDDIAMYF
CQQSRKVPWTGGGTKLEIKRGGGGGGGGGGGSQVQLKESGPGLVAPSQSL
ITCTVSGFSLTGYGVNWVRQPPGKGLEWLGMIWGDGSTDYN SALKSRLSITKD NS

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KSQVFLKMNSLQTDDTARYYCARDGYSNFHYYVMDYWGQGTSVTVSSDLEPKS
CDKTHTCPPCPAPELLGGPSVLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFN
WYVDGVEVHNNAKTKPREEQYNSTYRVVSVLVLHQDWLNGKEYKCKVSNKALP
APIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQ
5 PENNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSL
SLSPGKADPSNLLPSWAITLISVNGIFVICCLTYCFAPRCRERRNERLRRESVRPV

2H7-human IgE Fc (CH2-CH3-CH4) (nucleotide sequence) (SEQ ID NO: ____)

aagcttgcgcattggattttcaagtgcaggatttcagtttcgtctgtaatcagtgcgttcagtcataattgcgcaggacaatttgtctct
10 cccagttcccgcaatccgtctgcattccaggggagaaggtcacaatgacttgccaggccagtcaggtaagttaatcatgcact
ggtaccaggcagaagccaggatcccccacccctggatttatgcacccatccaacctggctctggagtcctgcgtcgttcaggta
gcaggatgggtctgggacacttactcttcacaatcagcaggatggaggctgaagatgctgccatttactgcagcaggatggagtt
taacccacccacgttccggctgggaccaagctggagctgaaagggtggcggctggcggtggatctggaggatgtggaggatgt
ggagcttcaggcttatctacagcagttctgggctgagctggtaggcctgggcctcagtgaaagatgtccctgcaaggcttcggc
15 tacacatttaccaggtaaatatgcactggtaaaggcagacaccctagacaggccctggatggatggagctttatccaggaaat
ggtgatacttcataatcagaaggtaaggcaggccacactgactgttagacaaatccctcagcacagectacatgcagtcag
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gcggccggcacttccccccgaccatccaggcttcgtgcctctggatccccaggactatcaacatcacctggctgg
20 ggacgggcaggcatggacgtggacttgcgtccaccgccttaccacgcaggagggtgagctggctccacacaaagcgagctca
ccctcagccagaagcactggctgtcagaccgcacccatgcggcaggatccatcaaggtcacaccttgaggacagccaa
gaagtgtcagattccaaacccggaggggtgagcgcctaccataaggccggccaggccgttgcacctgtcatccgcaagtcgc
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gaaccactccaccagaaggaggagaaggcagcgcataggcacttaccgtccaccctggccggatggccaccgg
25 ggatcgagggggagacccatggcagggtgacccaccccccacccatgcggccacccatgcggccac
cggcccggtctggccggaaagtcatacgcttgcgttgcacgcggagttggccggggagccggacaagcgcacccctgcctgc
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acgcagcccccgaagaccaaggctccggcttcgttccagccctggaggatggccgatggagcagaaaga
tgagttcatctggcgtcagttccatggcaggcagccctcacagaccgtccagcggccatgttaatcccgtaatgt
30 aatctaga

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2H7 scFv IgE (CH2-CH3-CH4) (amino acid sequence) (SEQ ID NO: ____)

MDFQVQIFSFLISAVIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLEKGGGGSGGGGSGGGSSQAYLQQSGAELVRPGASVKMSCK
5 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNQDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSA VYFCARVVYYSNSYWYFDVWGTGTTVSDHVCSDFTP
PTVKILQSSCDGGGHFPPTIQLLCVLSGYTPGTINITWLEDQVMDVDLSTASTTQE
GELASTQSELTLSQKHWSRDRYTQVTCQTYQGHTFEDSTKKCADSNPRGVSA YLSR
10 PSPFDLFIRKSPTITCLVVDLAPSKGTVNLTWSRASGKPVNHSTRKEEKQRNGTLTV
TSTLPVGTRDWIEGETYQCRVTHPHLPRALMRSTKTSGPRAAPEVYAFATPEWP
GSRDKRTLACLIQNFM PEDISVQWLHNEVQLPDARHSTTQPRKTKGSGFFVFSRLE
VTRA EWEQKDEFICRAVHEAASPSQTVQRAVSVNPGK

2H7 scFv MH (SSS) MCH2WTCH3 (nucleotide sequence) (SEQ ID NO: ____)

15 aagcttgcggccatggatttcaagtgcaggatttcagttccgtcaatcagtgc tt cagtcataattgccagaggacaatttgtctt
ccca gtc tcc agcaatccgtctgc atctccaggggagaaggcacaatgactgcaggcccagtc aagtgt aacatgcact
ggtaccaggcagaaggcaggatctccccaaaccctggatttatgc cccatccaacctggcttc lggagtccctgtcgcttc a cgtg
gc a g tgg g t c i g g g a c c t t a c t c t c a c a a t c a g c a g a g t g g a g g c t g a a g a g t g c t g c a c i t t a t c t g c a c a g c a g t g g a g t t
ta acccaccacgttcggcgtggaccaagctggagctgaaagatggcggctggcggctggatctggaggaggatg
20 ggagcttcaggcttatctacagcagtctgggctgagctgggaggcctggggcctcagtgaagatgtcctgcaaggcttcggc
tacacatttaccaggtaaatatgcactggtaaagcagacaccttagacaggccctggatggatggactttatccaggaaat
ggtgatacttcctacaatcagaagtcaaggcAACACTgacttagacaaatcctccagcacagcctacatgcagctcag
cagectgacatctgaagactctgcggctatttcgtcaagaggctgggtactatagtaactttactggacttcgatgtctgggcac
agggaccacggtcaccgtcttcgtatcaggagccaaatcttcgacaaaactcacacatccccaccgtccccagcacctgaac
25 tcctgggggatcgtcagttcccttccccccaaaacccaaggacaccctcatgatctccggacccctgaggatcacaatgcgtg
gtggggacgtgaggccacgaagaccctgaggtaagttcaactggcgtggcaggctgcaccaggactggctgaaatggcaagg
ccgcggggaggaggcactacaacagcacgtaccgtggcagtcgcctcaccgtccgtcaccaggactggctgaaatggcaagg
gtacaagtgc aagg tctccaacaaaggccctccagccccatcgagaaaacaatctccaaaggccaaaggcagccccgagaac
cacagggtacaccctgccccatccggatgagctgaccaagaaccaggcgtcgcctgcacccatgcgttatcc
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ggctcccttcctctacagcaagctcaccgtggacaagagcaggcagggacgtctctcatgc tccgtatgcatga
ggctctgcacaaccactacacgcagaagaggcctccctgtc tccggtaatgatctaga

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2H7 scFv MH (SSS) MCH2WTCH3 (amino acid sequence) (SEQ ID NO: ____)

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTYSLTISRVEAEDAATYYCQQWS
5 FNPPTFGAGTKLEKDGGGGGGGGGGGGSSQAYLQQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQFKKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVVYSNSYWYFDVWGTGTTVSSDQEPEKSSDK
THTSPPSPAPELLGGSSVFLPPKPKDTLMISRPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
10 KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQOPEN
NYKTPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

5B9 scFv MTHWTCH2CH3 (nucleotide sequence) (SEQ ID NO: ____)

15 aagcttgcgccatgagggtctctgctcagcttcgggctgtgcctcgatccactgcagatattgtgtatgcacgc
ggctgcatttcataatccaggtaacttttgcacatcagttccatctcctgcaggcttagtaagagtctcatacatatggcatca
cttatttttatggatctgcagaaggccaggccatgtccctcagtcctgatttatcagatgtccaaaccttgcctcaggatcccagaca
ggttcagtagcagtgggtcaggaactgtttcacactgagaatcagcagatggaggctgaggatgtgggtgtttattactgtgc
aaaatctagaacttccgcacgttcggtgctggaccaagctggagctgaaacgggtggcgtggctggcgggtggatgg
20 cgggtggcggcggatgtcacaggcgtcagtcaggacatggccatgtgcagtcctcacagacgcctgtccatcac
gcacagtctcggtttcttcatataactacccatgtgtacactgggtcgccagtcctcaggaaagggtctggatggcgtggagat
atggagttgtggaaatcacagactataatgcacgtttccatccagactgagcatccaaggacgattccaagagccaagtttctt
aaaatgaacagtctgcacactaatgacacagccattttactgtgcacggaaatgggggtgataactaccattactatgtatg
ctactggggtaaggaacctcagtcaccgtctctgtatcaggagccaaatcttgcacaaaactcacacatccccaccgtcccc
25 agcacctgaactcctgggggaccgtcagtccttccttcccccaaaacccaaaggacaccctcatgtcccgggaccctgag
gtcacatgcgtgggtggacgtgagccacagaacccctgaggtaagtcaacttgtacgtggacggcgtggaggtgcataat
gccaagacaaagccgcgggaggaggcagtaacacagcacgtaccgtgtggcagcgtccatccctgcaccaggactggct
gaatggcaaggagtacaagtgcacggatccaaacaagccctccagcccccattcagaaaaacaatctccaaagccaaaggc
agcccccggagaaccacagggttacaccctgccccatccggatgagctgaccaagaaccaggctgacccctggtca
30 aaggcttctatcccagcgacatgcgggtggagttggagagcaatggcagccggagaacaactacaagaccacgcctccctg
ctggactccgacggcttccttcctcatacgcaagctcaccgtggacaagagcagggtggcagcaggaaacgtttctcatgc
cgtgtatgaggctctgcacaaccactacacgcagaagagccttcctgtctccggtaatgatctaga

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5B9 scFv MTHWTCH2CH3 (amino acid sequence) (SEQ ID NO: ____)

MRFSAQLLGLLVWIPGSTADIVMTQAAFSNPVTLGTASISCRSSKSLLHSNGITY
LYWYLQKPGQSPQLLIYQMSNLASGVPDFSSSGSGTDFTLRISRVEADVGVYYC
5 AQNLELPLTGFAGTKLELKRGGGGGGGGGSSQVQLQSGPGLVQSSQSLIS
ITCTVSGFSLTTYAVHWVRQSPGKGLEWLGVIVSGGITDYNAAFISRLSITKDDSK
SQVFFKMNSLQPNDTAIYYCARNGGDNYPYYYAMDYWQGQTSVTVSSDQEPKSS
DKTHTSPPSPAPELLGGPSVFLFPPKPKDLMISRTPEVTCVVVDVSHEDPEVKFNW
YVDGVEVHNNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPA
10 PIEKTISKAKGQPREPVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQP
ENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

Human IgG1 hinge mutations**2H7 scFv- MTH (CSS) WTCH2CH3 (nucleotide sequence) (SEQ ID NO: ____)**

15 aagcttgcgccatggatttcaagtgcagatttcagttcctgtaatcagtgcgtcagtcataattgcacaggacaatttgtct
cccgatctccagcaatctgtctgcattccaggggagaaggcacaatgactgcaggccagctcaagtgttaattacatgcact
ggtaccacgcagaagccaggatcccccacaaacctggatttatgcacccatccaacctggctctggagttccctgctcgctcagg
tgcagggtctggcaccttactcttcacaatcagcagatggaggctgaagatgctgccacattactgcacgcaggatggaggat
20 taacccaccacgttcggtgctggaccaagctggagctgaaagatggcggtgctcgccgggtggatctggaggaggtg
ggagcttcaggctatctacagcagtcgtggctgagctggtaggcctgggcctcagtgaagatgtctgcacggctctgg
tacacattaccaggatacaatgcactggtaaagcagacacctagacagggcctggaatggatggaggatattatccaggaaat
ggtatacttcataatcagaaggatcaaggcaaggccacactgacttagacaaaatctccagcacgcctacatgcacgc
cagcctgacatctgaagactctgcggctattctgtcaagatgggtactatagtaactctactggatctcgatgtctggggcac
25 agggaccacggtcaccgtctttgtatcaggagccaaatctgtgacaaaactcacatccccaccgtccccagcacctgaac
tcctgggggaccgtcagttccttcccccacaaacctcatgtatccggccggctgaggcacatcgctg
gtgggtggacgtgagccacgaagaccctgaggtaagttcaactggtagtggacggcgtggagggtgcataatgccaagacaaag
ccgcgggaggaggcagtcacaacacgtaccgtgtggtagcgtccaccgtctgcaccaggactggtaatggcaagga
gtacaagtgcaggtctccaacaaagccctccagccccatcgagaaaacaatctccaaagccaaagggcagccccgagaac
30 cacagggttacaccctgccccatccggatgagctgaccaagaaccagggtcagcctgacccgtctggtaaaggcttatcc
cagcgcacatcgccgtggagtgggagagcaatggcagccggagaacaactacaagaccacgcctccgtctggactccgac

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ggctccitcttctctacagcaagctaccgtggacaagagcaggtggcagcagggaaacgtttctcatgctccgtatgcata
ggctctgcacaaccactacacgcagaagagccctccctgtccggtaaatgatctaga

2H7 scFv- MTH (CSS) WTCH2CH3 (amino acid sequence) (SEQ ID NO: ____)

5 MDFQVQIFSFLISAVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
10 TAYMQLSSLTSEDSA VYFCARV V Y SNS Y WYFDVWGTGTTVSSDQE PKSCDK
THTSPPSPAPELLGGPSVFLFP KPKDTLMISRTPEVTCVV DVSHEDPEVKFN WYV
DGVEVHNAAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQOPEN
NYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

15

2H7 scFv- MTH (SCS) WTCH2CH3 (nucleotide sequence) (SEQ ID NO: ____)

aagcttgcgccatggatttcaagtgcagatttcagttcctgtaatcagtgcgtcataatggcagaggacaaatgttct
cccaggctccagcaatctgtctgcatactccaggggagaaggcacaatgacttgcaggccagctcaagtgttaatcatgcact
ggtaccaggcagaaggcaggatccccc aaacctggatttatgc cccatccaacctggctctggagtcctgcgtcgtc
20 cagtggtctggaccttactctcacaatcagcagatggaggctgaagatgtccacttattactgccaggctggagtt
taacccacccacgttcggtgctggaccaagctggagctgaaagatggcggtggctggcggtggatctggaggagggt
ggagctcaggcttatctacagcagtctgggctgagctggtaggcctggccctcagtgaagatgtcctgcaaggctctggc
tacacattaccagttacaatatgcactggtaaaggcagacacccatgacaggccctggaaatggattggagctatttac
25 ggtgatacttccataatcagaagttcaaggcaggccacactgacttagacaaatccacgcacgcctacatgcagctc
cagcctgacatctgaagactctgcggctattctgtcaagatgggtactatagtaacttactggacttcgtctgggcac
agggaccacggtcaccgtcttcgtatcaggagccaaatctctgacaaaactcacatgccaccgtccccagcacctgaac
tccctgggggaccgtcagtttccttccccc aaacctggacccatgtctccggaccctgaggcataatgc
gtggggacgtgagccacgcaggccatggtaagttcaactggacgtggcgtggaggtgcataatgccaagacaaag
ccgcggaggaggcagttacaacacgcacgtaccgtgtggcagcgtccaccgtcaccaggactggctgaatggcaagg
30 gtacaagtgcaggttccaaacaagccctccagccccatcgagaaaacaatctccaaagccaaaggcagccccgagaac
cacagggttacaccctgccccatccggatgagctgaccaagaaccaggcgtaccgtcaccgtcaaaggcttatcc

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cagcgacatcgccgtggagtggagagcaatggcagccggagaacaactacaagaccacgcctccgtgactccgac
ggctccttcttcctctacagcaagctcacccgtggacaagagcaggtggcagcagggaaacgtttcatgcgttatgcata
ggctctgcacaaccactacacgcagaagagccctccctgtccctggtaaatgtatctaga

- 5 **2H7 scFv- MTH (SCS) WTCH2CH3** (amino acid sequence) (SEQ ID NO: ____)
MDFQVQIFSFLLISAVIIARGQIVLSQSPAILSASPGEKVTMTCRASSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGATLTVDKSSS
10 TAYMQLSSLTSEDSAVYFCARVVYYSNSYWYFDVWGTGTTVSSDQEPKSSDK
THTCPPSPAPELLGGPSVLFPPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWY
VDGVEVHNNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
NNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSL
15 SPGK

2H7 scFv- MTH (SSC) WTCH2CH3 (nucleotide sequence) (SEQ ID NO:)

aagcttgcgcgcatggatttcaagtgcagatttcagttcgtctgctaattcgttgtcataattccaggagaaatttgttct
cccagtctccagcaatcctgtctgcattccaggggagaaggtaacaatgacttgaggccagtcataattgttgttatcatgcact
20 ggtaccaggcagaagccaggatcccccacccctggatttatgcctccatccaacctggctctggagtcctgctcgttgt
gcagtgggtctgggaccttactcttcacaatcagcagagtggaggctgaagatgtccacttattactgccagcagtggagtt
taacccacccacgtcgggtctgggaccaagctggagctgaaagatggcggtctggcggtggatctggaggaggt
ggagcttcaggcttatcacagcagttctgggtctgagctggtagggctgggcctcagtgaagatgtcctgcaaggctctggc
tacacatttaccagtacaatatgcactggtaaaggcagacaccitagacagggcttggatggattggagctattatccaggaaat
25 ggtgatacttcctacaatcagaagttcaaggcaaggccacactgactgttagacaatctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcggctattctgtcaagagtggtagctatagtaactcttactggacttcgtgtctgggcac
agggaccacggtcaccgtcttctgtcaggagccaaatcttgcacaaaactcacacatccccaccgtgccagcacctgaac
tctggggggaccgtcagttctcttcccccacccaaaggacaccctcatgtatccggaccctgaggtcacatgcgt
gtggtaggtcagttccacgaagaccctgaggtcaagtcaactggtagtggacggcgtggaggtgcataatgccaagacaag
30 ccgcggggaggaggcagttacaacacgcacgtaccgtgtggcagcgtcctcaccgtctgcaccaggactggctgaatggcaagga
gtacaagtgcaggttccaaacaaaggcccccacccatcgagaaaacaatctccaaaggccaaaggcagccccggagaac

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cacagggtgacaccctgccccatccggatgagctgaccaagaaccaggcagcctgacgcctggtaaaggcttatcc
cagcgacatcgccgtggagtggagagcaatggcagccggagaacaactacaagaccacgcctccgtgctggactccgac
ggctccttccctcacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtttcatgctccgtatgcata
ggctctgcacaaccactacacgcagaagagcctctccgtctccggtaaatgatctaga

5

2H7 scFv- MTI (SSC) WTCH2CH3 (amino acid sequence) (SEQ ID NO: ____)

MDFQVQIFSFLISAVIIARGQIVLSQSPAILSASPGEKVTMTCRASSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAELVRPGASVKMSCK
10 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYYNSYWYFDVWGTGTTVSSDQEPKSSDK
THTSPPCPAPELLGGPSVFLPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWY
VDGVEVHNAAKTPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
15 NNYKTIIPPVLSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSL
SPGK

H1gGMHcys1 (nucleotide sequence) (SEQ ID NO: ____)

gtt gtt gat cag gag ccc aaa tct tct gac aaa act cac aca tg

20

H1gGMHcys2 (nucleotide sequence) (SEQ ID NO: ____)

gtt gtt gat cag gag ccc aaa tct tgt gac aaa act cac aca tct cca ccg tgc

H1gGMHcys3 (nucleotide sequence) (SEQ ID NO: ____)

25 gtt gtt gat cag gag ccc aaa tct tgt gac aaa act cac aca tgt cca ccg tcc cca gca cct

HuIgG1 MTCH3Y405 (nucleotide sequence) (SEQ ID NO: ____)

gggcagccccgagaaccacaggtgtacaccctgccccatccgggaggagatgaccaagaaccaggcagcctgacctgcct
ggtaaaggcttctatcccagcgacatgccgtggagtggagagcaatggcagccggagaacaactacaagaccacgcctc

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ccgtgctggactccgacggctccttacacctatacgcaagctcaccgtggacaagagcaggcaggcagcagggaaacgttttc
atgcgtccgtatgcatgaggctctgcacaaccactacacgcagaagagcctccctgtccccgggtaaatga

HuIgG1_MTCH3Y405 (amino acid sequence) (SEQ ID NO: ____)

5 GQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPP
VLDSDGSFYLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

HuIgG1_MTCH3A405 (nucleotide sequence) (SEQ ID NO: ____)

10 gggcagccccgagaaccacagggtacaccctgccccatcccgggaggagatgaccaagaaccaggcgtacgcctgacctgc
tgtcaaaggcttatcccagcgacatgcgcgtggagtgccggagaacaactacaagaccacgcctc
ccgtgctggactccgacggctcctgccttatagcaagctcaccgtggacaagagcaggcaggcagcagggaaacgttttc
atgcgtccgtatgcatgaggctctgcacaaccactacacgcagaagagcctccctgtccccgggtaaatga

HuIgG1_MTCH3A405 (amino acid sequence) (SEQ ID NO: ____)

15 GQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPP
VLDSDGSFALYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

HuIgG1_MTCH3A407 (nucleotide sequence) (SEQ ID NO: ____)

20 Gggcagccccgagaaccacagggtacaccctgccccatcccgggaggagatgaccaagaaccaggcgtacgcctgacctgc
tgtcaaaggcttatcccagcgacatgcgcgtggagtgccggagaacaactacaagaccacgcctc
cccggtctggactccgacggctccttcctgcgcagcaagctcaccgtggacaagagcaggcaggcagcagggaaacgttttc
catgcgtccgtatgcatgaggctctgcacaaccactacacgcagaagagcctccctgtccccgggtaaatga

HuIgG1_MTCH3A407 (amino acid sequence) (SEQ ID NO: ____)

25 GQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPP
VLDSDGSFFLASKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

HuIgG1_MTCH3Y405A407 (nucleotide sequence) (SEQ ID NO: ____)

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gggcagccccgagaaccacaggttacaccctccccatccggaggagatgaccaagaaccaggtcagcgtacccgc
ggtaaaggcttatcccagcgacatcgccgtggagtggagagcaatggcagccggagaacaactacaagaccacgc
ccgtgtggactccgacggctctcacctgccagcaagctaccgtggacaagagcaggtggcagcagggaaacgtctc
atgctccgtatgcatgaggctctgcacaaccactacacgcagaagagcctccctgtccccggtaaatga

5

HuIgG1 MTCH3Y405A407 (amino acid sequence) (SEQ ID NO:)

GQPREPVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPP
VLDSDGSFYLASKLTVDKSRWQQGNVFSCSVMHEALHNHYTOKSLSLSPGK

10 **HuIgG1 MTCH3A405A407 (nucleotide sequence) (SEQ ID NO:)**

gggcagccccgagaaccacaggtgtacaccctccccatcccgaggagatgaccaagaaccaggcgtacgcctgacctgcct
ggtcaaaggctctatcccagcgacatgccgtggagtggagagcaatggcagccggagaacaactacaagaccacgcctc
ccgtgctggactccgacggcttcgcctcgccagcaagctcacccgtggacaagagcaggtggcagcagggaaacgtttct
catgctccgtatgcataggctctgcacaaccactacacgcagaagagcctccctgtcccccgggtaaatga

15

HuIgG1 MTCH3A405A407 (amino acid sequence) (SEQ ID NO:)

GQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPP
VLDSDGSFALASKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLPGK

20 **2H7 scFv MTH (SSS) WTCH2MTCH3Y405 (nucleotide sequence) (SEQ ID NO:)**

25 taacccacccacgttcggctggaccagactgaaagatggcggtggctggcggtggatctggaggagggt
ggagctctcaggcttatcacagcagtctgggctgagctggtaggcctgggcctcagtgaagatgtcctgcaaggctctggc
tacacatttaccagttacaatatgcactggtaaagcagacacctagacagggcctggaatggattggagctatttacccaggaaat
ggtagacttcctacaatcagaagttcaaggcaaggccacactgacttagacaaatccctcagcacagcctacatgcagctcag
cagccctgacatctgaaagactctcggtctatctgtgaaagaactctactataactctactgtactttcgatgtctggggcc

30 agggaccacegtcacccgtcttctgtatcaggagccccaaatcttctgacaaaactcacacatccccacccgtccccaacactgtacac

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tcctgggggaccgtcagtcccttcccccaaaacccaaggacaccctcatgatctccggaccctgaggtcacatgcgtg
gtgggtggacgtgagccacgaagaccctgaggtcaagtcaactggtaactggacggcggtggagggtgcataatgccaagacaag
ccgcggggaggaggcagtacaacacagcacgtaccgtgtggcagcgtcctcaccgtcctgcaccaggactggctaatggcaagga
gtacaagtgcaggtctccaacaaagcccccagccccatcgagaaaacaatctcaaagccaaagggcagccccgagaac
5 cacagggtgtacaccctgccccatccgggaggagatgaccaagaaccaggctacgcctgacctgcgtcaaaggcttatcc
cagcgcacatcgcgtggagtggagagatggcagccggagaacaactacaagaccacgcctccgtgtggactccgac
ggcgccttctaccttatagcaagctaccgtggacaagagcaggtggcagcaggggaacgtttctcatgctccgtatgcatga
ggcgtctgcacaaccactacacgcagaagagccctccctgtcccggtaaatgatctaga

10 **2H7 scFv MTH (SSS) WTCH2MTCH3Y405 (amino acid sequence) (SEQ ID NO: ____)**
MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWIYAPSNLASGVPARFSGSGSGTYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
15 TAYMQLSSLTSEDSAVYFCARVVVYSNSYWYFDVWGTGTTVTVSSDQEPEKSSDK
THTSPPSPAPELLGGPSVFLFPKPKDTLMISRTPEVTCVVVDVSHEDEPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQOPEN
NYKTTTPVLDSDGSFYLYSKLTVDKSRWQQGNVFSCVMHEALHNHYTQKSLSL
20 PGK

2H7 scFv MTH (SSS) WTCH2MTCH3A405 (nucleotide sequence) (SEQ ID NO: ____)
aagcttgcgccatgatttcaagtgcagatttcagcttcgtcaatcagtgcattcgtcataattgcacaggacaaatttgtct
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25 ggtaccacgcagaagccaggatccctcccaaaaccctggatttatgcggccatccaacctggctctggagtcctgcgttcagg
gcagggtggctggacacttactcttcacaatcagcagactggaggctgaagatgctccacttattactgcacgcaggatgg
taacccaccacgtccgtgctggaccaagctggagctgaaagatggcggtggctggcggtggatctggaggagggt
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tacacatttaccagttacaatatgcactggtaaagcagacaccctagacagggcctggaaatggattggagctatccagaaat
30 ggtgataacttcctacaatcagaagttcaaggcaaggccacactgactgttagacaatctccagcacgcctacatgcagctc
cagccgtacatctgaagactctgcggctattctgtgcagactggtaactatagtaacttactggtaacttcgtatgtctgggcac

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agggaccacggtcaccgtcttctgatcaggagccaaatcttgcacaaaactcacacatccccaccgtccccagcacctgaac
tctggggggaccgtcagtcttcctttcccccaaaacccaaggacaccctcatgalctccggaccctgaggtcacatgcgtg
gtggtgacgtgagccacgaagacccctgaggtaacttgtacgtggacggcgtggaggtgcataatgccaagacaaag
cccgcccggaggaggcactacaacacgcacgtaccgtgttcagcgtccaccgtcaccaggactggctgaatggcaagga
5 gtacaagtgcaggtctccaacaaagccctccagccccatcgagaaaacaatctccaaagccaaagggcagccccgagaac
cacaggtgtacaccctgccccatccgggaggagatgaccaagaaccaggtagcgcctgacctgcctgtcaaaggcttatcc
cagcgcacatcgccgtggagtggagagcaatggcagccggagaacaactacaagaccacgcctccgtgtggactccgac
ggctccitcgccctctatagcaagctcaccgtggacaagagcaggtagcggcagggaaacgtcttcattgtccgtgtcatga
ggctctgcacaaccactacacgcagaagagccctccctgtccccggtaatga

10

2H7 scFv MTH (SSS) WTCH2MTCH3A405 (nucleotide sequence) (SEQ ID NO: ____)
mdfqvqifsfllisaviiargqivlsqspailsaspgekvmtcrasssvsymhwyyqqkpgsspkpwiyapsnlasgvparf
sgsgsgtsysltisrveaedaatyyccqwsfnpptfgagtklekdggsgggssqaylqqsgaelvrpgasmvc
kasgyttsynmhwwkqtprqglewigaiypngdtsynqkfkgatltvdksstaymqlssltsedsavyfcarvyyysn
15 sywyfdvwgtgttvssdqepkssdkthtsppspapellggpsvflfppkpkdtlmisrlpevtcvvvdvshedpevkfnw
yvdgvevhnaktkpreeqynstyrvsvltvlhqdwlngkeykckvsnkalpapiektskakgqprepqvylppsreemt
. knqvsltclvkgfypsdiavewesngqpennyktppvldsdgsfalysklvdksrwqqgnvfscvmhealhnhytqksl
slspgk

20 **2H7 scFv MTH (SSS) WTCH2MTCH3A407 (nucleotide sequence) (SEQ ID NO: ____)**
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2H7 scFv MTH (SSS) WTCH2MTCH3A407 (amino acid sequence) (SEQ ID NO: ____)

10 MDFQVQIFSLLISASVIIARGQIVLSQSPAIALSASPGEKVTMTCRASSSYMHWY
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FNPPPTFGAGTKLELKDGGSGGGGGGGGSSQAYLQQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQFKKGKATLTVDKSSS
TAYMQLSSLTSEDSA VYFCARVVYYSNSYWYFDVWGTGTTVTVSSDQEPKSSDK
15 THTSPPSPAPELLGGPSVFLFPKPKDLMJSRTPEVTCVVVDVSHEDEPKFNWYV
DGVEVHNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
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PGK.

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2H7 scFv MTH (SSS) WTCH2MTCH3Y405A407 (nucleotide sequence) (SEQ ID NO: ____)

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2H7 scFv MTH (SSS) WTCH2MTCH3Y405A407 (amino acid sequence) (SEQ ID NO: ____)

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15 FNPPTFGAGTKLELKDGGSGGGGGGSSQAYLQQSGAELVRPGASVKMSCK
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20 KTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQOPEN
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2H7 scFv MTH (SSS) WTCH2MTCH3A405A407 (nucleotide sequence) (SEQ ID NO: ____)

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2H7 scFv MTH (SSS) WTCH2MTCH3A405A407 (amino acid sequence) (SEQ ID

15 NO: _____
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20 TAYMQLSSLTSEDSA VYFCARVV YNSY WYFDVWGTGTTVTVSSDQEPKSSDK
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25 PGK

2H7 scFv MTH (SCC) WTCH2CH3 (nucleotide sequence)

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15

2H7 scFv MTH (SCC) WTCH2CH3 (amino acid sequence)

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20 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNQDTSYNQFKKGKATLTVDKSSS
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EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
25 NNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSL
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2H7 scFv MTH (CSC) WTCH2CH3 (nucleotide sequence)

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2H7 scFv MTH (CSC) WTCH2CH3 (amino acid sequence)

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25 EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
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SPGK

2H7 scFv MTH (CCS) WTCH2CH3 (nucleotide sequence)

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15 ggctcccttcctctacagcaagctaccgtggacaagagcaggtggcagcagggaaacgttctcatgctccgtatgcata
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2H7 scFv MTH (CCS) WTCH2CH3 (amino acid sequence)

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSVSYMHWY
20 QQKPGSSPKPWIYAPSNLASGVPARFSGSGSGTYSLTISRVEAEDAATYYCQQWS
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SPGK

30 HuIgAH IgA-T4-ORF (nucleotide sequence)

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HuIgAH IgA-T4-ORF (amino acid sequence)

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15 PLTATLSKSGNTFRPEVHLLPPPSEELALNELVTLTCLARGFSPKDVLVRWLQGSQ
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1D8-IgAH IgA-T4-CD80 (nucleotide sequence)

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AA

10 1D8 scFv IgAH IgA-T4-CD80 (amino acid sequence)

MDFQVQIFSLLISASVIMSRGVDIVLTQSPTTIAASPGEKVTITCRASSVSYMYWY
QQKSGASPKLWIYDTSKLASGVPNRFSGGSGSGTSYSLAINTMETEDAATYYCQQW
SSTPLTFGSGTKLEIKRGGGGGGGGGGGSQVQLKEAGPGLVQPTQTLSLTCTV
SGFSLTSDGVHWIRQPPGKGLEWMGIYYDGGTDYNNSAIKSRLSISRDTSKSVFLK
15 INSLQTDDTAMYCARIHFDYWQGVMTVSSIDQPVPSTPPTPSPSTPPTPSPSCC
HPRLSIHRPALEDLLLGESEALTCTLTGLRDASGVFTWTPSSGKSAVQGPPDRDL
CGCYSVSSVLPGCAEPWNHGKTFTCTAAYPESKPTLTATLSKSGNTFRPEVHLLPP
PSEELALNELVTLTCLARGFSPKDVLVRWLQGSQELPREKYLTwASRQEPESGQTTT
FAVTSILRVAEADWKKGDTFSCMVGHHEALPLAFTQKTIDRLAGKPTHVNVSVV
20 AEVDADPSNNLLPSWAITLISVNGIFVICCLTYCFAPRCRERRNERLRESVRPV

human IgE Fc (CH2-CH3-CH4) ORF (nucleotide sequence)

tgatcacgtctgcctcaggacttcacccgcccaccgtgaagatttacagtcgtcctgcacggcggcggcactccccccg
accatccagctcctgtcctcgctctgggtacaccccaggactatcaacatcacctggctggaggacggcaggcatggacg
25 tggacttgtccaccgccttaccacgcaggagggtgagctggccctccacacaaagcgagtcaccctcagccagaagcactggc
tgtcagaccgcacctcacctgcacaggtcacatcaaggtcacacccgttggaggacaccaagaagtgtcagattccaaccc
gagaggggtgagcgcctacctaagccggcccgccgtcgaccgttgcacccgttggaggacaccaagaagtgtcagattccaaccc
gacctggcaccaggcaagggaccgtgaacctgtaccgttggccggccgtgggaagcctgtgaaccactccaccagaaagg
aggagaagcagcgaatggcacgttaaccgtcacgtccaccctggccgtggcaccggagactggatcgagggggagaccta
30 ccagtgcagggtgacccacccacctgcccaggccctcatgcgtccacgaccaagaccagcggccgcgtgcctgc
gaagtctatgcgttgcacgcggagtgccggggacaagcgcaccctgcctgcgtatccagaacttcatgc

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gaggacatctcggtgcagtggctgcacaacgaggtcagctccggacgcccggcacagcacgcacgcagcccccaagacc
aagggtccggcttcgttctcgccgtggaggtgaccaggccgaatggagcagaaagaatgagttcatctgcctgcag
tccatgaggcagcagccccctcacagaccgtccagcagcgggtctgttaatccggtaaagcggatccctcgaa

AA

5 **human IgE Fc (CH2-CH3-CH4) ORF (amino acid sequence)**

DHVCSRDFPTPTVKILQSSCDGGGHFPPTIQLLCLVSGYTPGTINITWLEDGQVMVD
DLSTASTTQEGERLASTQSELTLSQKHWLSDRTYTCQVTYQGHTFEDSTKKCADSN
PRGVSAVLSRPSPFDLFIRKSPTITCLVVVLAPSKGTVNLTSRASGKPVNHSTRKE
EKQRNGTLTVTSTLPVGTRDWIEGETYQCRVTHPHLPRALMRSTTKTSGPRAAPE
10 VYAFATPEWPGSRDKRTLACLIQNFMPPEDISVQWLHNEVQLPDARHSTTQPRKTK
GSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVNPKGADPS

1D8 scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (nucleotide sequence)

aagcttatggatttcaagtgcagatitcagcttcgtctaattcgttcgtccatgtccagaggactgcataatgtcc
15 agtctccaacaaccatagctgcattccaggggagaaggicaccatcaccgcgcgtgccagtcgttgcatttgc
accagcagaagtcaaggcgtccctaaactctggatttatgcacacatccaagctggctctggagttccaaatgc
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ccgctcacgttcgggtctgggaccaagctggagatcaaacggggggcggctggcggcgggtggcgggtggc
gatctcaggcagctgaaggaggcaggacactggctggcaaccgcacacagaccctgcacatgcactgt
20 ctcatttaaccagcgatgggttacactggattcgacagecctccaggaaagggtctggatgggataataat
cacagattataattcagcaattaaatccagactgagcatcagcaggacacctccaagagcca
25 gttttctaaaaatcaacagtctg
caaactgatgacacagccatgtattactgtccagaatccactttgattactggggcaaggactcatgg
acgtctgtccaggacttcaccccccaccgtgaagatcttacagtcgtccgtgcacggcggcgg
ccagctcctgtgcctcgltctgggtacaccccaggactataacatcac
30 ttgtccaccgccttaccacgcaggagggtgagctggccctccacacaaggc
gacgcacccatcacctgcccagggtcaccttatcaaggactcac
gggtgagcgcctacctaagccggcccccaggccgttcgac
ggcaccaggcaaggggaccgtgaacctgac
aagcagcgaatggcac
35 cagggtgacccaccccccac
atgcgttgcgacgcggag
352

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atctcggtgcagtggctgcacaacgaggtgcagctccggacgcccggcacagcacgcagcccccaagaccaaggc
ccggcttcgtctcagccgcctggaggtgaccaggccaatggagcagaaagatgagttcatctgcgtgcagtc
ggcagcagccccctcacagaccgtccagcgagcggtgtctgtaaatccggtaaagcggatcctcgaagctccatctggc
cattaccctaatctcagtaaatggaaattttgtgatatgctgcctgacctactgcttgcccaagatgcagagagagaagg
5 agagattgagaaggaaagtgtacgccctgtataaattcata

1D8-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (amino acid sequence)

MDFQVQIFSFLLISASVIMSRGVDIVLTQSPTTIAASPGEKVITCRASSSVSYMWY
QQKSGASPKLWIYDTSKLASGVPNRFSGSGSGTSYSLAINTMETEDAATYYCQQW
10 SSTPLTFGSGTKLEIKRGGGGGGGGGGGSQVQLKEAGPGLVQPTQTLSTLCTV
SGFSLTSDGVHWIRQPPGKGLEWMGIYYDGTDYNNSAIKSRLSISRDTSKSQVFLK
INSLQTDDTAMYCYARIHFDYWQGVMVTVSSDHVCSDFTPPTVKILQSSCDGG
GHFPPTIQLLCLVSGYTPGTINITWLEDGQVMDVDLSTASTTQEGERLASTQSELTLS
QKHWLSDRTYTCQVTYQGHTFEDSTKKCADSNPRGVSAYLSRPSPFDLFIRKSPTI
15 TCLVVVDLAPSKGTVNLTSRASGKPVNHSTRKEEKQRNGJLTVTSTLPVGTRDWI
EGETYQCRVTHPHLPRALMRSTTKTSGPRAAPEVYAFATPEWPGSRDKRTLACLI
QNFMPEDISVQWLHNEVQLPDARHSTTQPRKTGSFFVFSRLEVTRAWEQKDE
FICRAVHEAASPSQTVQRAVSVNPKA
20 DPSKLPSWAITLISVNGIFVICCLTYCFAP
RCRERRNERLRRESVRPV

20

5B9-IgAH IgA-T4-CD80 (nucleotide sequence)

aagcttgcgcacatgaggctctgtcagcttctgggctgtgtctggatccctggatccactgcagatattgtatgacgc
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25 CTTATTTGTTGTAATCGCAGAACGCCAGGCTCCTCAGTCCTGATTATCAGATGTCCAACCTTGCCTCAGGAGTCCCAGACA
GGTCAGTAGCAGTGGTCAGGAACTGATTCAACTGAGAACATCAGCAGAGTGGAGGCTGAGGATGTGGTGTATTACTGTGTC
AAAATCTAGAACCTCCGCTCACGTTGGTGCTGGACCAAGCTGGAGCTGAAACGGGGTGGCGGTGGCTGGCGGTGGTGG
30 CGGGTGGCGCGGATCGTCACAGGTGCGACTGAAGCAGTCAGGACCTGGCTAGTGCAGTCCTCACAGAGCCTGTCATCACCT
GCACAGTCCTGGTTCTCATTAACTACCTATGCTGTACACTGGGTCGCCAGTCCTCAGGAAGGGTCTGGAGTGGCTGGAGTGT
ATGGAGTGGTGAATCACAGACTATAATGCAGCTTCATATCCAGACTGAGCATCACCAAGGACGATTCCAAGAGCCAAGTTTCTT
AAAATGAACAGTCGAACCTAATGACACAGCCATTATTACTGTGCCAGAAATGGGGTGTATAACTACCCATTACTATGCTATGGA
CTACTGGGGTCAAGGAACCTCAGTCACCGTCTCTGTAGCAGCCAGTCCCTCAACTCCACCTACCCATCTCCCTCAACTCCACCT

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accccatctccctatgtgccaccccgactgtcactgcaccgaccggccctgaggaccgtcttaggttcagaagcgatcc
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ccacctgaccgtgaccctgtggctgtacagcgttccagtgccctgcccgtgtccgagccatggaaaccatggaaagacctt
cacttgactgctgcctaccccgagttccaagaccccgtaaccgcaccctctcaaattccggaaacacattccggcccgaggtc
5 cacctgctgcgcgcgcgtggaggagctggcctgaacgcgactggtgacgcgtgcctggcacgtggctcagccccaa
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ctgtgtcatggcggagggtggacgcggatcgtcaacaacctgtccatctggccattacctaattcgtaaatgaaatttt
10 gtgaaatgtgcctgacactgtttggccaaagatgcagagagagaaggaggaatgagaaggaaagtgtacgcc
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5B9-IgAH IgA-T4-CD80 (amino acid sequence)

MRFSAQLLGLLVWIPGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLLHSNGITY
15 LYWYLQKPGQSPQLIYQMSNLASGPDRFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLIFGAGTKLELKRGGGGGGGGGSSQVQLKQSGPGLVQSSQSL
ITCTVSGFSLTTYAVHWVRQSPGKGLEWLGVWSGGITDYNAAFISRLSITKDDSK
SQVFFKMNSLQPNDTAIYYCARNGGDNYPYYAMDYWQGQTSVTVSSDQPVPST
PPTPSPPTPSPSCCHPRLSLHRALEDELLGSEAILTCLTGLRDASGVTFTWTPS
20 SGKSAVQGPPDRDLCGCYSVSSVLPGCAEPWNHGKTFTCTAAYPESKTPLATLS
KSGNTFRPEVHLLPPPSEELALNELVTLTCLARGFSPKDVLVRWLQGSQELPREKY
LTWASRQEPSQGTTFAVTSILRVAADWKKGDTFSCMVGHEALPLAFTQKTIDR
LAGKPTHVNVSVVMAEVADPSNNLLPSWAITLISVNGIFVICCLTYCFAPRCRER
RRNERLRRESVRPV

25

5B9-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (nucleotide sequence)

aagcttgcgcgcattgagggtctgtcagttctgggctgtgtgcgtccactgcagatattgtgtgcacgc
ggctgcattctccaatccaggcacttggAACATCAGCTCCATCCTGCAGGTCTAGTAAGAGTCCTACATAGTAATGGCATCA
CTTATTGTTATTGGTATCTGCAGAAGCCAGGCCAGTCCTCAGTCCTGATTATCAGATGTCCAACCTGGCTCAGGAGTCCCAGACA
30 ggttcagtagcagtgggtcaggaactgattcacactgagaatcagcagagtgaggctgaggatgtgggtgtttattactgtgctc
aaaatctagaacttccgctacgttggcgtgggaccaagctggagctgaaacggggtgccggctggcgggtgggtgggtgggt

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cgggtggcggcgatcgtcacaggcgcagctgaagcagtcaaggacccggcttagtgcagtccacacgcgtccatcacct
gcacagtctctggtttcattactacccatgctgtacactgggtcgcagtcaggaaagggtctggagtggctggagtgat
atggagtggtaatcacagactataatgcagcttcataatccagactgagcatccaaggacattcaagagccaagtttctt
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5 ctactgggtcaaggaacccatcagtcaccgtctccctgtatcacgtctgcctccaggacttcaccccccaccgtgaagatcttaca
gtcgccctgcgacggcggcggcactccccccgaccatccagtcctgtgcctcgtctgggtacaccccaggactatcaac
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caaagcggactcaccctcagccagaagcactgctgtcagaccgcacctacacgtccaggtcacatcaaggtcacacccatgg
aggacacgaccaagaagtgtcagattccaacccgagaggggtgagcgcctacctaagccggccagccgtogacactgttca
10 tccgcaagtgcgccacgatcacctgtctgggtgggacccgcaccagcaaggggaccgtgaacctgacctggccggcc
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15 cggcacagcacgcacgcagcccccaagaccaaggctccgttctcgcttcagccgcctggaggtgaccaggccgaat
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20 5B9-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (amino acid sequence)

MRFSAQLLGLLVWIPGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLLHSNGITY
LYWYLQKPGQSPQLLIYQMSNLASGPDRFSSSGSGTDFTLRISRVEADVGVYYC
AQNLELPLTFGAGTKLELKRGGGGGGGGGSSQVQLKQSGPGLVQSSQSL
ITCTVSGFSLTTYAVHWVRQSPGKGLEWLGVWSGGITDYNAAFISRLSITKDDSK
25 SQVFFKMNSLQPNDTAIYYCARNGGDNYPYYYAMDYWQGQTSVTVSSDHVCSR
DFTPPTVKILQSSCDGGGHFPPTIQLLCLVSGYTPGTINITWLEDGVMDVDSL
TTQEGERLASTQSELTLSQKHWLSDRTYTCQVTYQGHTFEDSTKKCADSNPRGVSA
YLSRPSPFDLFIRKSPTITCLVVVDLAPSKGTVNLTSRASGKPVNHSTRKEEKQRNG
TLTVTSLPVGTRDWIEGETYQCRVTHPHLPRALMRSTTSGPRAAPEVYAFATP
30 EWPGSRDKRTLACLIQNFMPEDISVQWLHNEVQLPDARHSTTQPRKTKGSFFVFS
RLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVPNGKADPSKLPSWAITLISV
NGIFVICCLTYCFAPRCRERRNERLRRESVRPV

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2e12-scFv-IgAH IgA-T4-CD80 (nucleotide sequence)

aagcttatggatttcaagtgcagatttcagcttcgtctaattcgtgcataatgtccagaggagtcgacattgtgtcaccc
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5 taatgcgttgtaccaacagaaccaggacagccaccctactcctcatctgtgtcatccaacgtagaatctggggccctgc
aggtttagtggcagtggtctgggacagacttcagcctaaccatccatctgtggaggaggatattgtcaatgtatttgc
aaagttaggaaggttcctggacgttcggtgaggccacaagctggaaatcaaacgggtggcggtggctcgccggagggtgg
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10 atggggtaatggaaagcacagactataattcagctcaatccagactgagcatccaaggacaactccaagagccaagttctt
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actggggtaaggaacacctcagtcaccgtctccatcagatcagccagttccctcaactccacccatccctcaactccaccta
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15 cacctgaccgtgaccctgtgtggctgtacagcgtgtccagtgtccctgcccggctgtgtccgagccatggaaaccatggaaagaccctc
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20 ggtggccacgaggccctgcccgtggcttcacacagaagaccatcgaccgttggcggtaaaccaccatgtcaatgtgtct
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gatatgtgcctgacctactgtttccccaaagatgcagagagagaaggagaatgagagattgagaaggaaagtgtacgcct
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2e12-scFv-IgAH IgA-T4-CD80 (amino acid sequence)

MDFQVQIFSFLLISASVIMSRGVDIVLTQSPASLA VSLGQRATISCRASESVEYYVTS
LMQWYQQKPGQPPKLLISAASNVESGVPARFSGSGSGTDFSLNIHPVEEDDIAMYF
CQQSRKVPWTGGGTKLEIKRGGGGGGGGGGGSQVQLKESGPLVAPSQSLSI
ITCTVSGFSLTGYGVNWVRQPPKGLEWLGMIWGDGSTDYN SALKSRLSITKD
30 KSQVFLKMNSLQTDDTARYYCARDGYSNFHYVMDYWGQGTSVTVSSDQPVPS
TPPTPSPSTPPTPSPSCCHPRLSLHRPALEDLLLGSEAILTCTLGLRDASGVFTWTP
SSGKSAVQGPPDRDLCGCYSVSSVLPGCAEPWNHGKTFTCTAA YPESKTPLTATLS

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KSGNTFRPEVHLLPPPSEELALNELVLTCLARGFSPKDVLVRWLQGSQELPREKY
LTWASRQEPSQGTTFAVTSILRVAEADWKKGDTFSCMVGHEALPLAFTQKTIDR
LAGKPTHVNVSVMMAEVADPSNNLLPSWAITLISVNGIFVICCLTYCFAPRCRER
RRNERLRRESVRPV

5

2e12-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (nucleotide sequence)

aagcttatggatttcaagtgcagatttcagttccgtataatcgtgcaggatcgacattgtgtcaccc
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taatgcagtggtaccaacagaaaccaggacaggccacccaaactcctcatctgtcgtccatccaacgtagaatctggggtccctgcc
10 aggttttagtggcagtgggtctgggacagacttcagccctcaacatccatcctgtggaggaggatgatattgtcaatgtatttcgtcagc
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15 aaaaatgaacagtctgcaactgtgacacagccagatactactgtgccagagatggttatagtaactttcattaciatgttattggact
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tcgtcctgcacggcgccggcactccccccgaccatccagtcctgtgcctgtctgggtacaccccgaggactatcaacat
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30

2e12-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (amino acid sequence)

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MDFQVQIFSFLLISASVIMSRGVDIVLTQSPASLAWSLGQRATISCRASESVEYYVTS
LMQWYQQKPGQPKLLISAASNVESGVPARFSGSGSGTDFSLNIHPVEEDDIAMYF
CQQSRKVPWTFGGGTKLEIKRGGGSGGGSGGGSQQLKESGPGLVAPSQSLSI
ITCTVSGFSLTGYGVNWVRQPPGKGLEWLGMIWGDSTDYNALKSRLSITKD
5 KSQVFLKMNSLQTDDTARYYCARDGYSNFHYYVMDYWGQGTSVTVSSDHCSR
DFTPPPTVKILQSSCDGGGHFPPTIQLLCLVSGYTPGTINITWLEDGQVMVDVLSTAS
TTQEGERLASTQSELTLSQKHWLSDRTYTCQVTYQGHTFEDSTKKCADSNPRGVSA
YLSRPSPFDLFIRKSPTITCLVVDLAPSKGTVNLTWSRASGKPVNHSTRKEEKQRNG
TLTVTSTLPVGTRDWIEGETYQCRVTHPHLPRALMRSTTKTSGPRAAPEVYAFATP
10 EWPGSRDKRTLACLIQNFMPEDISVQWLHNEVQLPDARHSTTQPRKTKGSGFFVFS
RLEVTRAWEQKDEFICRAVHEAASPSQTVQRRAVSVNPKGADPSKLPSWAITLISV
NGIFVICCLTYCFAPRCRERRNERLRRRESVRPV

500A2 scFv (nucleotide sequence)

15 atgttgtatacatctcagtcctggcttttactttctggattcagccatccagaagtgacatagtgctgcgactcagactccagccactc
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20 gtcgcagcagtccgggtctgaacttagggaaacctggggcctcagtgaaactgtcctgcaagacttcaggctacatattcacagatc
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25

500A2 scFv (amino acid sequence)

MLYTSQLLGLLLFWISASRSDIVLTQTPATLSLIPGERVTMTCKTSQNIGTILHWYH
QKPKEAPRALIKYASQSIPGIPSRSFSGSGSETDFTLSINNLEPDDIGIYYCQQSRSWPV
TFGPGTKLEIKRGGGGGGGGGGGGGGGSQVKLQQSGSELGKPGASVKLSCKTSGYIF
30 TDHYISWVKQKPGESLQWIGNVYGGNGGTSYNQKFQGKATLTVDKISSTAYMEL
SSLTSEDSAIIYCYARRPVATGHAMDYWGOGIOTVSSD

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NT

5' oligo:

Name : IgGWT3

GTTGTTTCGAAGGATCCGCTTACCCGGAGACAGGGAGAGGCTCTT

5 NT

3' oligo:

Name : hIgGWT5

GTTGTTAGATCTGGAGGCCAAATCTTGTGACAAAACACACACATG

NT

10 5' oligo:

Name : FADD5

Sequence

GTTGTGGATCCTTCGAACCCGTTCTGGTGCTGCTGCACACTCGGTGTCG

NT

15 3' oligo:

Name : FADD3

Sequence

GTTGTTATCGATCTCGAGTTATCAGGACGCTTCGGAGGTAGATGCGTC

NT

20 **FADD-CSSCFV (nucleotide sequence)**

gtggatccttcgaacccggtcctggctgcactcggtgtccagccgtcgagcagcgagctgaccgagctcaagttccta
tgccctggggcgctggcaagcgcaagctggagcgcgtcagagcggcttagacctttccatgctgtggagcagaacga
cctggagccccgggacacccgagctctgcgcgagctgcgcctccctggcgccacgacctgtcgccgcgtcgacgact
tcgaggcgggggcgccggccggggccgcgcctgggaagaagacactgtgtcagcattaacgtcatatgtgataatgtgggg
25 aaagattggagaaggctggctgtcagctcaaagtctcagacaccaagatcgacagcatcgaggacagatacccccaacctg
acagagcgtgtcgccggagtcactgagaatctggaaacaacacagaaggagaacgcaacagtggcccacctggtggggctc
tcaggtcctgccagatgaacctggctgacctggtaacaagagggtcagcaggcccgtgacccatcagaacacaggagtggggcca
tgtccccatgtcatggaaactcagacgcattacccatcggataactcgagatcgataacaac

30 **FADD-CSSCFV (amino acid sequence)**

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VDPSNPFLVLLHSVSSSLSSELTELKFLCLGRVGKRKLERVQSGLDLFSMLLEQND
LEPGHTELLRELLASLRRHDLLRRVDDFEAGAAAGAAPGEEDLCAAFNVICDNVG
KDWRRRLARQLKVSDTKIDSIEDRYPRNLTERVRESLRIWKNTKEKENATVAHLVGA
LRSCQMNLVADLVQEQQARDLQNRSGAMSPMSWNSDASTSEAS

5

HCD28tm5B (nucleotide sequence)

GTTGTGGATCCTCCCTTGGTGCTGGTGGTGGTGCCTGGCTTGCTAT
AGCTTG

10 **HCD28tm3S (nucleotide sequence)**

GTTGTTCGAACCCAGAAAATAATAAAGGCCACTGTTACTAGCAAGCTATAGC
AAGCCAG

HCD28tm5' (nucleotide sequence)

15 GTTGTGGATCCTCCCTTGGTGCTGGTGGT

HCD28tm3' (nucleotide sequence)

GTTGTTCGAACCCAGAAAATAATAAAGGCCAC

20 **HCD80tm5' (nucleotide sequence)**

GTTGTGGATCCTCCTGCTCCCATCCTGG

HCD80tm3' (nucleotide sequence)

25 GTTGTTCGAACGGCAAAGCAGTAGGTCAGGC

MFADD5BB (nucleotide sequence)

GTTGTGGATCCTCGAACCCATTCCCTGGTGCTGCTGCACTCGCTG

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MFADD3XC (nucleotide sequence)

GTTGTTATCGATCTCGAGTCAGGGTCTTGAGGAAGACAC

- 5 **Murine FADD nucleotide sequence** (full length, but without flanking -Ig or transmembrane sequences) (**nucleotide sequence**)

gtggatcttcgaacatggaccattcctggtgcactcgctgtccggcagccgtcggcaacgatctgatggagctcaa
gttcttgccgcgagcgcgtgagcaaacgaaagctggagcgcgtgcagagtggcctggaccgtcacggfctgctggagca
gaacgacctggagcgcggcacaccggctgcgcgagttgcgcctcgctgcgcgacacgatctactgcagcgcctgg

- 10 acgacttcgaggcggggacggcaccgctgcgcgcggggaggcagatctgcaggcattgacatttgtgtgacaatgt
tggggagagactggaaaagactggcccgcagctgaagggtctgaggccaagatggatggattgaggagaagtaccccg
aagtctgactgagcggtaagggagactctgaaagtctggagaatgctgagaagaacgcctcggtggccggactgtca
aggcgcgtcggacacctcaggctgaatctggctgaccctggatggagaagccaggaaatctgtgagcaagagtgagaatatgt
ccccagtagtactaaggattcaacttgttccctcagaaacaccctgactcgagatcgat

15

Murine FADD (amino acid sequence)

VDPSNMDPFLVLLHSLSGSLSGNLMLKFLCRERVSKRKLERVQSGLDLFTVLLE
QNDLERGHTGLLRELLASLRRHDLLQRLLDDFEAGTATAAPPGEADLQVAFDIVCD
NVGRDWKRLARELKVEAKMDGIEEKYPRSLSERVRESLKVKNAEKKNASVA
20 GLVKALRTCRLNLVADLVEEAQESVSKSENMSPVLRDSTVSSSETP

MCASP3-5 (nucleotide sequence)

GTTGTGGATCCTCGAACATGGAGAACAAACAAAACCTCAGTGGATTCA

- 25 **MCASP3-3 (nucleotide sequence)**

GTTGTTATCGATCTCGAGCTAGTGATAAAAGTACAGTTCTTCGT

MCASP8-5 (nucleotide sequence)

GTTGTTTCGAACATGGATTCCAGAGTTGTCTTATGCTATTGCTG

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MCASP8-3 (nucleotide sequence)

GTTGTTATCGATCTCGAGTCATTAGGGAGGGAAGAAGAGCTTCTCCG

5 **hcasp3-5(nucleotide sequence)**

GTTGTGGATCCTTCGAACATGGAGAACACTGAAAACTCAGTGGAT

hcasp3-3 (nucleotide sequence)

GTTGTTATCGATCTCGAGTTAGTGATAAAAATAGAGTTCTTGAG

10

hcasp8-5 (nucleotide sequence)

GTTGTGGATCCTTCGAACATGGACTTCAGCAGAAATCTTATGAT

hcasp8-3 (nucleotide sequence)

15 GTTGTTATCGATGCATGCTCAATCAGAAGGGAAGACAAGTTTTTCT

1. 2H7 scFv with alternative VHL11 mutations:

Nucleotide sequence

Aagcttgcgccatggattcaagtgcagatttcagcttcgtcataatgcgcaggacaattgttctc
20 tcccagtctccagcaatccgtctgcattcccgaggagaaggcacaatgacttgccaggccagctcaagtgtaaatgcac
tgttaccacgcagaagccaggatctccccaaacctggatttatgcctatccaaacctggctctggagtcctgcgttcagt
ggcagtgggtctggacacttactcttcacaatcagcagactggaggctgaatgtgcacttattactgcgcagcgtggagt
tttaaccaccacgttcgtctggaccagctggagctgaaatggccgtggctggcggtggatctggaggaggt
gggagctcaggcttatcacagcagtctgggctgag (one of the following: tcn, acn, gan, can, aan,
25 cgn, agn)

gtgaggcctgggcctcagtgaagatgtctgcaggctctggctacacattaccagttacaatatgcactggtaaagcagaca
cctagacagggcctggaatggattggagctttatccaggaaatggtgataacttcctacaatcagaagtcaaggcaaggccac
actgactgttagacaaaatccctccagcacagcctacatgcagctcagcgcctgacatctgaagactctgcggctattctgtcaag
30 agtgggtactatagtaactttactggacttcgatgtctgggacagggaccacggcaccgtcttcgtatcag

Amino acid sequence

MDFQVQIFSFLLISASVIIARGQIVLSQSPAIALSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWIYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAE (one of the following:
35 **S, T, D, E, Q, N, R, K, H**)
VRPGASVKMSCKASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFK

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GKATLTVDKSSSTAYMQLSSLTSEDSAVYFCARVVVYSNSYWYFDVWGTGTTVT
VSSDQ

2. VHL11 deletion

5 Nucleotide sequence:

Aagcttgcgcacatggatttcaagtgcagatttcagcttcgtctaattcaggcataattgcacaggacaattgtctc
tcccgactccagcaatccgtctgcattccaggggagaaggcacaatgactgcaggccagctcaagttaagtatcatgcac
tgttaccacgagaaggcaggatctccccaaacctggatttatgcccattccaacctggctctggagtcctgctcgcttcagt
ggcagtgggtctggacacttactctcacaatcagcagagtgaggctgaagatgctgccacttattactgccagcgtggagt
tttaaccacccacgtcgggtgtggaccaacttacttgcataatcagcagactgttagacaaaatctccagcacagccatgcagtc
ggcgttcaggattatctacagcagtctggggctgaggtgaggccctggctcagtaagatgtctgcaggcatttcggct
acacatttaccaggatataatgcactggtaaaggcagacaccttagacaggccctggaaatggattggagctatttatccaggaaatg
gtgatacttccatcataatcagaagtcaaggcagggcactgactgttagacaaaatctccagcacagccatgcagtc
ggcctgacatctgaagactctgcggctatttcgtgcataagtggtactatagtaacttactggacttgcgtctggcaca
gggaccacggtcaccgtcttgcgtac

Amino acid sequence:

MDFQVQIFSFLISAVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSYMHWY
QQKPGSSPKPWIYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
20 FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAEVRPGASVKMSCKA
SGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQFKKGKATLTVDKSSST
AYMQLSSLTSEDSAVYFCARVVVYSNSYWYFDVWGTGTTVTVSSDQ

3. 2H7 VL L106 with alternative mutations

25 Nucleotide sequence:

aagcttgcgcacatggatttcaagtgcagatttcagcttcgtctaattcaggcataattgcacaggacaattgtctc
cccaggactccagcaatccgtctgcattccaggggagaaggcacaatgactgcaggccagctcaagttaagtatcatgcact
tgttaccacgagaaggcaggatctccccaaacctggatttatgcccattccaacctggctctggagtcctgctcgcttcagt
gcagtgggtctggacacttactctcacaatcagcagagtgaggctgaagatgctgccacitattactgccagcgtggagt
tttaaccacccacgtcgggtgtggaccaagtgagg (tcn, agn, aan, cgn, can, gan, and non-natural
30 derivatives of these codons) aaagatggcggtggtggctggcgggtggatctggaggaggtggagc

Amino acid sequence:

MDFQVQIFSFLISAVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSYMHWY
QQKPGSSPKPWIYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
35 FNPPTFGAGTKLE (S, T, R, K, H, Q, N, D, E, and non-natural derivatives of these
amino acids at position 106) KDGGGSGGGSGGGGSS

4. VL L106 deletion

40 Nucleotide sequence:

Aagcttgcgcacatggatttcaagtgcagatttcagcttcgtctaattcaggcataattgcacaggacaattgtctc
tcccgactccagcaatccgtctgcattccaggggagaaggcacaatgactgcaggccagctcaagttaagtatcatgcac
tgttaccacgagaaggcaggatctccccaaacctggatttatgcccattccaacctggctctggagtcctgctcgcttcagt
ggcagtgggtctggacacttactctcacaatcagcagagtgaggctgaagatgctgccacitattactgccagcgtggagt
tttaaccacccacgtcgggtgtggaccaagtgaggaaagatggcggtggtggctggcgggtggatctggaggaggtgg
45 gagtc

Amino acid sequence:

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MDFQVQIFSFLISASVIIARGQIVLSQSPAALSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWIYAPSNLASGVPARFSGSGSTSLSRVEAEDAATYYCQQWS
FNPPTFGAGTKLEKDGGGSGGGSGGGSS

5 **5. IgE CH3 CH4**

Nucleotide sequence:

tccaaccggagagggtgagcgccctacctaaggccggcccagccgcgttgcacctgttcatccgcgaagtgcgcacgatcacgttc
tggtggggacctggcaccaggcaaggggaccgtgaacctgacccgttgcgtccggccagtggaaaccgtgtgaaccactccacc
agaaaggaggagaagcagcgcataaccgttacccgttgcgttgcacccgttgcgttgcgttgcgttgcgttgcgttgcgttgc
10 agacccatccaggcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
gccccggaaagtctatcggttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
catgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
aagaccaggcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
15 gttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
Amino acid sequence:

SNPRGVSAYLSPSPFDLFIRKSPTITCLVVVLAPSKGTVNLTSRASGKPVNHSTR
KEEKQRNGTLTVTSLPVGTRDWIEGETYQCRVTHPHLPRALMRSTTKTSGPRAA
PEVYAFATPEWPGSRDKRTLACLIQNFMPEDISVQWLHNEVQLPDARHSTTQPRK
20 TKGSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVPNGK

6. hIgG1H/IgE WCH3 WCH4

Nucleotide sequence:

tgatcaggagccaaatcttgcacaaaactcacacatccccaccgttccacgcacatccaaaccggagagggtgagcgccctaccta
25 agccggcccagcccggttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
accgttacccgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
cgttacccgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
30 cgttacccgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
ggagtggccggggagccggacaagcgcacccgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
gcacaacgggttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
35 gcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
ggttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
cagccgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
40 cagccgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
Amino acid sequence:

DQEPKSSDKTHTSPPSPASNPRGVSAYLSPSPFDLFIRKSPTITCLVVVLAPSKGTV
NLTWSRASGKPVNHSTRKEEKQRNGTLTVTSLPVGTRDWIEGETYQCRVTHPHL
PRALMRSTTKTSGPRAAPEVYAFATPEWPGSRDKRTLACLIQNFMPEDISVQWLH
NEVQLPDARHSTTQPRKTKGSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQT
VQRAVSVPNGK

40

7. IgE WCH2 WCH3 WCH4

Nucleotide sequence:

Tgatcacgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
45 accatccaggcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
tggacitgtccaccgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
tgtcagaccgcacccgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
gagagggttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
50 gacccgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
aggagaaggcgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
ccagtgcagggttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc
gaagtctatgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgc

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gaggacatctggcgtcagtgctgcacaacgagggtgcagctccggacgccccgcacagcacgacgcagcccccaagacc
aagggctccggcttctcgcttcagccgcctggaggtgaccagggccgaatgggagcagaaagatgagttcatctgccgtcag
tccatgaggcagcggagccctcacagaccgtccagcgcagcggtgtctgttaaatcccgtaaatgataatctaga

- 5 Amino acid sequence:
DHVCSRDFPTPTVKILQSSCDGGGHFPPTIQLLCLVSGYTPGTINTITWLEDGQVMDF
DLSTASTTQEGERLASTQSELTLSQKHWLSRTYTCQVTYQGHTFEDSTKKCADSN
PRGVSAYLSPRSPFDLFIRKSPTITCLVVDLAPSKGTVNLTSRASGKPVNHSTRKE
EKQRNGTLTVTSTLPVGTRDWIEGETYQCRVTHPHLPRALMRSTTKTSGPRAAPE
10 VYAFATPEWPGSRDKRTLACLIQNFMPEDISVQWLHNEVQLPDARHSTTQPRKTK
GSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVPNPK

8. hIgG1H/IgE CH3 CH4 (ORF)

Nucleotide sequence:

- 15 tgatcaggagccaaatctcgacaaaactcacacatccccaccgtccccagcatccaacccgagaggggtaggcgcctaccta
agccggcccagccgttcgacctgttcatccgcaagtgc(cc)acgatcac(tg)ctgtggac(tgg)cacccagcaagggg
accgtgaac(tg)ac(tg)ccggccag(tgg)aagcc(tg)taaccactccaccagaaggaggagaagcagcgcaatggca
cgtaac(cgt)cac(gt)ccacc(tg)ccggcacc(ga)actggatc(gaggggg)agac(tacc)agtgcagggtagccaccc
cac(tg)ccagggcc(tat)cggtccacgaccaagacccagcggcccgctgtgc(cc)ccggaaagtctatgcgttgcacgc
ggagtggccggggagccggacaagcgcacccctgcctgc(tat)gtccagaacttcatgcctgaggacatctcggtgcagtgg
gotgcacaacgagg(tg)cagtc(cc)ggacgcccggcacagcacgacgcagccccgcaagaccaaggc(tcc)ggc(ttc)gtctca
gccgc(tg)ggagg(tg)gaccaggccgaatggagcagaaagatgagttcatgc(cc)gtgcagtccatgaggcagcgagccctca
cagaccgtccagc(gagc)gg(tg)tctgttaatccggtaaagcggatc(t)tcgaa

- 25 Amino acid sequence:
DQEPKSSDKTHTSPSPASNPGRGVAYLSRPSPFDL FIRKSPTITCLVVVDLAPSKGTV
NLTWSRASGKPVNHSTRKEEKQRNGTLTVTSLPVGTRDWIEGETYQCRVTHPHL
PRALMRSTTKTSGPRAAPEVYAFATPEWPGSRDKRTLACLIQNFMPEDISVQWLH
NEVQLPDARHSTTQPRKTKGSFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQT
30 VQRAVSVNPGKSGSFE

9. 2H7 VHL11S scFv hIgG1(SSS-S)H hIgE WCH3 WCH4

Nucleotide sequence:

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Amino acid sequence:

5 MDFQVQIFSFLLISAVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWIYAPSNLASGVPARFSGSGSGTSYSLISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGGGGGGSSQAYLQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
TAYMQLSSLTSEDAVYFCARVVYYSNSYWYFDVWGTGTTVSSDQEPKSSDK
THTSPPSSASNPRGVSAYLSPSPFDLFIRKSPTITCLVVVLAPSKGTVNLTSRASG
KPVNHSTRKEEKQRNGLTVTSTLPVGTRDWIEGETYQCRVTHPHLPRALMRSTT
10 KTSGPRAAPEVYAFATPEWPGSRDKRTLACLIQNFMPEDISVQWLHNEVQLPDAR
HSTTQPRKTKGSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVPN
GK

10. 2H7 VHL11S scFv hIgG1(SSS-P)H hIgE WCH3 WCH4

15

Nucleotide sequence:

aagcttgcgcgcattttcaagtgcaggatttcagcttcgtctaactgtgttcgtcataattcccgaggacaatgttct
cccaggctccaggcaatccgtctgcattccaggggagaaggcacaatgacttgcaggccagtcataatgttaactatgcact
ggtaccaggcagaagccaggatctccccaaaccctggatttgcggccatccaaacctggctctggagtccctgtcgctcagg
20 gcaggctgggtctggacacttactctcacaatcagcagactggaggctgaagatgtgtccacttattactgtccagcaggctggagg
taacccacccacgtcgggtctggaccaagctggaggctgaagatggcggctggcggcgggtggatctggaggagg
ggagctcaggcttatctacagcagctgggtgagtcggfaggcctgggcctcagtgaagatgtccgtcaaggctctggc
tacacattaccaggtaataatgcactggtaaaaggcagacacactagacaggccctggatggattggagcttattatccaggaaat
25 ggtgatacttccatcacaatcagaaggtaaaggcagacacactagactgttagacaaaatctccagcagacactcatgcagctcag
cagectgacatctgaagactctgcggctatttctgtcaagactgtgtactatagtaacttactgttacttgcgtctgggcac
aggaccacggcgtaccgtctctgtacaggagccaaatctgtacaaaactcacacatccccaccgtccccagcatccaacc
cgagaggggtgagcgcctacctaagccggccagccgttcacccgttgcacccgttgcacccgttgcacccgttgcacccgttgc
ggaccttggcaccaggcaaggggaccgttaacccgttgcacccgttgcacccgttgcacccgttgcacccgttgcacccgttgc
30 accaggcagggttgcacccaccccccacccgttgcacccgttgcacccgttgcacccgttgcacccgttgcacccgttgcaccc
ggaaatgttgcgttgcacccggagttggccggggagccggcacaaggcgcacccgttgcacccgttgcacccgttgcaccc
tgaggacatctcggcgtcactggctgcacaacgcgggtgcagctccggcagccggcacaaggcgcacccgttgcacccgttgcaccc
aagggtccggcttgcgttgcagccgttgcggaggtgaccaggccgaatgggagcagaaatgttgcacccgttgcacccgttgcaccc
tccatgaggcaggcagccctcacaaggccgttgcacccgttgcgggtgtctgtaaatccggtaaatgtataatctaga

35

Amino acid sequence:

MDFQVQIFSFLLISAVIARGQIVLSQSPA ILSASPGEKVTMTCRASSVSYMHWY
QKPGSSPKPWYAPSNLASGVPARFSGSGSGT SYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQSGAESVRPGASVKMSCK
40 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYSNSYWYFDVWGTGTTVSSDQEPKSSDK
THTSPSPASNPRGVSA YLSRPSPFDLFIRKSPTITCLVVLDAPS KGTVNLTWSRASG
KPVNHSTRKEEKQRNGTLTVTSTLPVGTRDWIEGETYQCRVTHPHLPRALMRSTT
45 KTSGPRAAPEVYAFATPEWPGSRDKRTLACLIQNFM PEDISVQWLHNEVQLPDAR
HSTTQPRKTKGSGFFVFSRLEVTRA EWEQKDEFICRAVHEAASPSQTVQRAVSVNP
GK

10. 2H7 VL L106S

50 aagctggccgcatggatttcaagtgcagatttcagcttctgcataatcagtgcgtcagtcataattggccaggagacaattgttctt
cccagtctccagcaatctgtctgcattccaggggagaaggcacaatgactgcagggccagtcataatgttacatgcact
gttaccaggcagaaggccaggafctctccccaaacctcgatattatgcctccatccaaaccttgcttctggatccctgtcgcttcgt

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gcagtgggtctgggacctcttactcttcacaatcagcagagtgaggctgaagatgctgccacttattactgccagcagtggagtt
taacccacccacgtcggctgggaccagctggagctgaaagatggcggtcgccgggtggatctggaggaggt
ggagtc

5 Amino acid sequence:

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSTSLSRVEAEDAATYYCQQWS
FNPPTFGAGTKLESKDGGSGGGSGGGSS

10 **11. 2H7 VL L106S scFv**

Nucleotide sequence:

aagcttgcgcattgtttcaagtgcagatttcagcttcgtctaattcgttcgtcataattgcgcaggacaatttgtct
cccagtctccagcaatccgtctgcattccaggggagaaggcacaatgcgtcaggccagtcaggtaatttacatgcact
ggtaccacgcagaaggcaggatcccccacccctggatttatgcgcatttcacccatccaacctggcttgcgtccgttcgt

15 gcagtgggtctgggacctcttactcttcacaatcagcagagtgaggctgaagatgctgccacttattactgcgcaggatggagtt
taacccacccacgtcggctgggaccagctggagtcataaagatggcggtcgccgggtggatctggaggaggt
ggagcttcaggcttatctacagcgtctgggtgagtcgttgcaggctggccctcgttgcaggatgtcctgcagggt
tacacatttaccagttacaatatgcactggfaaaagcagacaccttagacaggccctggaaatggattggagctatttacccaggaaat
ggtgatacttcctacaatcagaagtcaaggcaaggccacactgttagacaatccctcagcacgcctacatgcagtcag
20 cggcctgacatctgaagactctggcttgcaggatgggtactatagtaacttactgttgcgttgcacccatgcagtcac
aggaccacggtcaccgtctctgtatcag

Amino acid sequence:

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
25 QQKPGSSPKPWYAPSNLASGVPARFSGSGSTSLSRVEAEDAATYYCQQWS
FNPPTFGAGTKLESKDGGSGGGSGGGSSQAYLQQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
TAYMQLSSLTSEDSAVIDFCARVVVYSNSYWYFDVWGTGTTVSSDQ

30 **12. 2H7 scFv VL L106S VHL11S scFv**

Nucleotide sequence:

Aagcttgcgcattgtttcaagtgcagatttcagcttcgtctaattcgttcgtcataattgcgcaggacaatttgtct
tcccaatccgtctgcattccaggggagaaggcacaatgcgtcaggccagtcaggtaatttacatgcac
tggtaccacgcagaaggcaggatcccccacccctggatttatgcgcatttcacccatccaacctggcttgcgtccgtcgttcgt
35 ggcagtgggtctgggacctcttactcttcacaatcagcagagtgaggctgaagatgctgccacttattactgcgcaggatggagtt
tttaacccacccacgtcggctggaccagctggagtcataaagatggcggtcgccggcggtggatctggaggaggt
gggagcttcaggcttatctacagcgtctgggtgagtcgttgcaggccctcgttgcaggatgtcctgcaggcttcgt
gtcacacatttaccagttacaatatgcactggfaaaagcagacaccttagacaggccctggaaatggattggagctatttacccaggaaat
atggtgatacttcctacaatcagaagtcaaggcaaggccacactgttagacaatccctcagcacgcctacatgcagtc
40 agcagccgtgacatctgaagactctggcttattctgtcaagatgggtactatagtaacttactgttgcgttgcacccatgcagtc
acaggaccacggtcaccgtctctgtatcag

Amino acid sequence:

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
45 QQKPGSSPKPWYAPSNLASGVPARFSGSGSTSLSRVEAEDAATYYCQQWS
FNPPTFGAGTKLESKDGGSGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
TAYMQLSSLTSEDSAVIDFCARVVVYSNSYWYFDVWGTGTTVSSDQ

50 **10. Human IgD hinge linker with attached restriction sites**

Nucleotide:

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gtggatccagggtcgaagtctccaaaggcacaggcctcctccgtgccactgcacaaccccaagcagagggcagcctgccaa
ggcaaccacagccccagccaccacccgtAACACAGGAAGAGGAGGAAGAAGAAGGAGAAAGGAGAAAGGAGAA
caagaagagagagacaagacccgtgcagtcac

5 Amino acid:

VDPGSKSPKAQASSVPTAQPQAEGSLAKATTAPATTRNTGRGEEKKKEKEKEEQ
EERETKTGAVD

Sequence of Native IgD hinge domain:

10 (includes a cysteine residue—we truncated the hinge prior to that residue for these constructs:)

Nucleotide:

gagttccaaaggcacaggcctcctccgtgccactgcacaaccccaagcagagggcagcctgccaaggcaaccacageccc
cagccaccacccgtAACACAGGAAGAGGAGGAAGAAGAAGGAGAAAGGAGAAACAAGAAGAGAGAA
15 gacaaagacaccagagtgtccgagccacaccagcctctggcgttacctgctaaccct

Amino acid sequence:

ESPKAQASSVPTAQPQAEGSLAKATTAPATTRNTGRGEEKKKEKEKEEQERET
KTPECPSTSHTQPLGVYLLTP

20

12. 2H7 VH L11S

Nucleotide sequence:

caggcataatcacaggcgtctgggcttagtcggtgaggccggggctcatgtaagaatgtcgtcaaggcttcgtacacatt
accaggtaataatgcactggtaaagcagacacctagacaggcctggatggattggagctatttatccaggaaatggtgatact
25 tctacaatcagaagtcaagggcaaggccacactgactgttagacaaatccctccagcacagcctacatgcagctcagcagcctga
catctgaagactctgggttatttctgtcaagagtgggtactatagtaactctactgttacitcgatgtctgggacacaggacc
acggtcaccgtctttct

Amino acid sequence:

30 QAYLQQSGAESVRPGASVKMSCKASGYTFTSYNMHWVKQTPRQGLEWIGAIYPG
NGDTSYNQKFKKGATLTVDKSSSTAYMQLSSLTSEDSAVYFCARVVYYNSYWY
FDVWGTGTTVTVSS

13. 2H7 VH L11S scFv

35 Nucleotide sequence:

aagcttgcgcacatggatttcaagtgcagatttcagcttcgtcaatcagtgcgttcagtcataattgcacaggacaattgttct
cccagtcctccagcaatccgtctgcattcccgaggagaaggcacaatgcactgcaggcccagtcaggtaagtgttacatgcact
ggtaccaggcagaaggcaggatcccccacaaacctctggatttatgcctccatccaacctggcttcggagccctgctcgccttcgt
40 gcagggtgtctgggacttctactcttcacaatcagcagatggaggctgaagatgcgtccacttattactgcacagcgtggagitt
taacccacccacgttcgggtctgggaccaagttggagctgtcaagatggcgttgcggcgggtggatctggaggagggttg
ggagctctcaggcttatctacagcactgtgggttgagtcggtgaggcctggccctcgtgaagatgtcctgcaggcgttgc
tacacatttaccaggtaataatgcactgggtaaagcagacacctagacaggcctggatgggttggagctatttatccaggaaat
50 ggtgtacttcataatcagaagtcaagggcaaggccacactgactgttagacaaatccctccagcacagcctacatgcagctcag
cagcctgcacatctgaagactctgggttatttctgtcaagagtgggtactatagtaactctactgttacitcgatgtctgggac
agggaccacggtcaccgtcttcgtatcag

Amino acid sequence:

MDFQVQIFSFLLISASVIIARGQIVLSQSPAIALSASPGEKVMTCRASSSVSYMHWY
QQQPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
50 FNPPTFGAGTKLELDGGGGGGGGGGGGSSQAYLQQSGAESVRPGASVKMSCK

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ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQFKKGATLTVDKSSSTAYMQLSSLTSEDSA
VYFCARVVVYSNSYWYFDVWGTGTTVSSDO

14. 2H7 scFv VH L11S hIgG1 (CSC-S)H WCH2 WCH3

5 Nucleotide sequence:

25 Amino acid sequence:

30 MDFQVQIFSLLISAVILARGQIVLSQSPAIALSASPGEKVTMTCRASSSYMHWY
QQKPGSSPKPWLYAPSNLASGVPARFSGSGSGTSYSLISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYSNSYWYFDVWGTGTTVSSDQEPKSCDK
THTSPPCSAPELLGGPSVFLFPKPKDLMISRTPEVTCVVVDVSHEDPEVKFNWY
VDGVEVHNNAKTKEEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
NNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSL
35 SPGK

15. 2H7 scFv VH L11S IgE WCH2 WCH3 WCH4

Nucleotide sequence:

40 aagctgccgcatggattcaagtgcagatttcagcttcgtctaattcgttcaggcataattccagggacaattttct
cccagtctccagcaatcctgtcatctccaggggagaaggcacaatgactgcagggccagctcaagtgtacatgcact
ggtaccacgcagaagccaggatccccaaaccctggatttatgccccatccaaacctggctctggagtcctgcgcitcagtg
gcagtgggtctggacacttactctcacaatcagcagactggaggctgaagatgctccacttattactgcacgcaggatgtt
taacccacccacgtcgggtctggaccaactggagctgaagatggcggtgccggcggtgtggatctggaggaggatg
ggagctcctcaggcttatcacagcagactggctgagtcgtgaggcctgggcctcagtgaagatgtcctgcaggctctggct
45 acacatttaccagttacaatatgcactggtaaaggcagacacactagacaggcctgaaatggattggagcttattccaggaaatg
gtgatacttcctacaatcagaagttcaaggcaggccacactgactgttagacaaaatctccagcacagccatgcagctcagc
aggcctgacatctgaagactctggcttattctgtcaagactgggtactatagtaacttctactgttacttcgtatgtgggcaca
gggaccacggcgtaccgtctttgtacacgtctggacttcaccccgccccacggtaagatttacagtcgtctgcac
ggcggcgggacttccccccgaccatccagctccgtgcctgtctgggtacaccccgaggactatcaacatcacctggcttgg
aggacgggcaggcatggactggacttgtccaccgccttaccacgcaggagggtgagtcggccctccacacaaagcgagctc
50 accctcagccagaagcactgcgtcagaccgcacccatcacctgcacccatcaaggtcacaccccttgaggacagccacca

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5
agaagtgtcagattccaaaccggagagggtgagcgcctacctaagccggccagccgttcgcacctgttcatccgaagtgc
ccacgatcacctgtctgggtggacctggcacccagcaaggggaccgtgaacctgacctggccggccagtggaaagct
gtgaaccactccaccagaaaggaggagaagcagcgcataatggcacgttaaccgtcacgtccaccctgcccgtggcaccc
actggatcgagggggagacattaccagtgcagggtgaccacccccaccgtgcgcagggccctatgcggccacgaccaagac
cagcggcccgcgtgcgtcccggaagtctatgcgttgogacgcggagtgccggggagccggacaagcgcacccctgccc
tgcgtatccagaacttcatgcctgaggacatctcggtgcagtggctgcacaacgcggatgcagtcggacgcggacacagc
acgacgcagcccccaagaccaagggtccggcttcgtctcagggccctggaggtgaccaggccgaatggagcagaa
agatgagttcatctgcgtgcagtccatgaggcagcgcagccccctcagacgcgtccagcgcagcgggtctgtaaatcccgtaa
tgtataatctaga

10

Amino acid sequence:

15 MDFQVQIFSLLISAVIILARGQIVLSQSPA ILSASPGEKVTMTCRASSSVYMHWY
 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
 FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQSGAESVRPGASVKMSCK
 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKGKATLTVDKSSS
 TAYMQLSSLTSEDAVYFCARVVYYSNSYWYFDVWGTGTTVSSDHVCSDRFT
 PPTVKILQSSCDGGGHFPPTIQLLCLVSGYTPGTINITWLEDGQVMDVDSLSTASTTQ
 EGELASTQSELTLSQKHWLSDRTYTCQVTYQGHTFEDSTKKCADSNPRGVSAIYL
 RPSPFDLFIRKSPTITCLVVDLAPSKGTVNLTWSRASGKPVNHSTRKEEKQRNGTLT
 20 VTSTLPVGTRDWIEGETYQCRVTHPHLPRALMRSTTKTSGPRAAPEVYAFATPEW
 PGSRDKRTLACLIQNFM PEDISVQWLHNEVQLPDARHSTTQPRKTKGSGFFVFSRL
 EVTRA EWEQKDEFICRAVHEAASPSQTVQRAVSVNPGK

16. 2H7 scFv VH L11S mIgE WCH2 WCH3 WCH4

25 Nucleotide sequence:

aagttgcgcgcattggatttcaagtgcagatlttcagcttcgtcaatcagtgccatgttcaggcataattccagaggacaatgttct
cccagtctccagcaatccgtctgcattccaggggagaaggcacaatgactgcagggccagctcaagtgtaaagtacatcgact
gttaccagcagaagccaggatcctccccaaaccctggatttatgccccatccaaacctggctctggagtcctgtcgcgttcagg
gcagtgggtctggacccttactctcacaatcagcagtgaggctgaagatgtgtccacttattactgcccagcagtggagtt
taacccacccacgttcggctggaccagaactggagctgaaagatggcggtggtcgccgggttgtggatctggaggagggt
ggagcttcaggcttatctacagcagtcgggctgagctgtgaggcctgggctcagtgaaagatgtctgcaggcctctgg
acacatttaccagttacaatatgcactggtaaagcagacacccatgacaggcctgaaatggattggagttttatccaggaaatg
gtgatacttcctacaatcagaagttcaaggcAACACTgacttagacaaaatccctccaggcacagcctacatgcagtcagc
aggcgtacatctgaagacttcggcttattctgtcaagtggtgactatagtaacttactgttacttcgtgtctggggcaca
gggaccacggtcaccgtcttcgtacacgttcgaccgtcaacatcactgagccacccatggagctactccattcatctgcacc
ccaatgcattccactccaccatccagctgtactgcttcatttatggccacatcctaaatgatgtctctgtcagctggctaatggacgatc
gggagataactgatacacttcgcacaaactgttctaattcaaggaggaaggcAACTggcttacgtcagtaaactcaacatcactg
agcagcaatggatgtctgaaagcaccctcacgtcaaggcgtacccatggcgttagactattggcccacactcggagatgccc
gtcatgagccacgggtgttacacttacccatgtccaccagccccctggaccgtatcaaaccggcgtccaaagcttacccatgtt
ctgggtggacctggaaagcgagaagaatgtcaatgtacgttgaaaccaagagaagaagacttcgtctcagcatccctgtt
acactaagcaccacaataacgcaccaactagtagtacccatctgtcgttagttgccaaggactggattgaaggctacggctatc
agtgcataatggaccaccctgttcccaagccattgtgtccatcacaagacccaggcgcgtcagcccccgaggta
tatgtgttccaccaccagaggagggagcggaggacaacgcacactcaccgtttgtatccagaacttccctgaggatatct
gtgcagtggctggggatggaaactgatctcaaaacgcacccatgttccatcacaacccctgaaatccaaatggotccaaatcaa
ggcttcctcatcttcgtccatgtccaggcataactggacacccatggacagaaaaacagttcacccatgtccatgatccatgaggc
acttcgaaaccaggaaactggagaaaacaatccacaagcccttggtaacccatctccgtccatcttagtaatcttagag

Amino acid sequence:

50 MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSGGGSSOAYLQOSGAESVRPGASVKMSCK

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ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
 TAYMQLSSLTSEDSA VYFCARV VYY SNSY WYFDVWGTGTTVSSDHVRPVNIT
 EPTLELLHSSCDPNAFHSTIQLYCFIYGHILNDVSWSWLMDDREITDTLAQTVLIE
 EGKLASTCSKLNITEQQWMSESTFTCKVTSQGV DYL ATRRCPDHEPRGVITYLIP
 5 PSPLDLYQNGAPKLTCLVV DLESEKVNVTWNQEKKTSVSASQWYTKHHNNATT
 SITSILPVVAKDWIEGYGYQCIVDHPDFPKIVRSITKTPGQRSAPEVYVFPPPEESE
 DKRTLTLCLIQNFFPEDISVQWLGDGKLISNSQHSTTPLKSNGSNQGFFIFSRLEVAK
 TLWTQRKQFTCQVIHEALQKPRKLEKTISTSLGNTSLRPS

10 **17. 2H7 scFv VH L11S hIgA WH WCH2 T4CH3**

Nucleotide sequence:

aagcttgcggccatggatttcaagtgcagatttcagcttcgtcta atc agtgc t c a g t c a t a a t g c c a g a g g a c a a a t t g t c t c t
 cccagtc tcc a g c a a t c c t g t c g a t c t c c a g g g g a a g g t c a c a a t g a c t g c a g g g c c a g t c a a g t g t a a g t t a c a t g c a c t
 ggtaccacgc a a g c c a g g a t c t c c c c c a a a c c c t g g a t t a t g c c c c a t c c a a c c t g g c t c t g g a g t c c c t g c t c g t c a g t g
 15 g c a g t g g g t c t g g g a c c t t a c t c t c a c a t c a g c a g a g t g g a g g c t g a a g a t g c t g c c a c t t a t t a c t g c a c a g c a g t g g a g t t
 ta a c c c a c c c a c g t c g g t g c t g g a c c a a g t g g a g g c t g a a a g a t g g c g g t g g c t c g g g c g g t g g a t c t g g a g g a g g t g
 gg a g c t c t c a g g c t t a t c a c a g c a g t c t g g g c t g a g t c t g t g a g g c c t g g c t c a g i g a a g a t g c t c g a a g g c t c t g g t
 ac a c a t t a c c a g t t a c a a t a t g c a c t g g g t a a a g c a g a c a c c t a g a c a g g g c t g g a a t g g a t t g g a g c t a t t a t c a g g a a a t g
 g t g a t a t c c t a c a a t c a g a g t t a c a a g g g c a a g g c c a c a c t g a c t g t a g a c a a a t c c t c a g c a c a g c c t a c a t g c a g c t c a g c
 20 a g c c t g a c a t c t g a a g a c t c t c g g g c t a t t c t g c a a g g t g g t g a c t a g t a c t g g t a c t t e g a t g t c t g g g c a c a
 g g g a c c a c g g t c a c c g t c t c t c t g a t c a g c c a g t t c c c t c a a c t c c a c c t a c c c a t c t c c t c a a c t c c a c c t a c c c a t c t c c t
 c a t g c t c c a c c c c c a c t g c a c t g c a c c g a c c g g c c c t c a g g a c c t g c t c t t a g g t t c a g a a g c g a t c c t c a c g t c a c a c t g
 a c c g g c c t g a g a g a t g c c t c a g g i g t c a c c t t c a c c t g g a c g c c c t c a a g t g g g a a g g a g g c g t g t c a a g g a c c a c t g a c c g t g
 25 a c c t c t g g c t g c t a c a g c g t g t c a g i g t c c t g c g g g c t g t g c g a g c c a t g g a a c c a t g g g a a g a c c t c a c t t g c a c t g c t
 g c t a c c c c g a g t c c a a g a c c c c g t a a c c g c c a c c c t c t c a a a a t c c g g a a c a c a t t c c g g c c c a g g t c a c c t g c t g c c g
 c c g c g t c g g a g g a g c t g g c c t g a a c g a g g c t g g c t g c a c g t g c a c g t g c t g c a c g t g c a c g t g c t g c a c g t g c t
 c g t g g c t g c a g g g g t c a c a g g a g c t g c c c c g c g a g a a g t a c c t g a c t t g g g c a t c c c g g c a g g a c c c a g g c a c c a
 c c a c c t c g c t g t g a c c a g c a t a c t g c g c t g g c a g c c g a g g a c t g g a a g a g g g g a c a c c t c c t c g a t g g t g g g c a c g
 30 a g g c c t g c c g t g c t c a c a c a g a a g a c c a t g a c c g c t t g g g t a a a c c c a c c c a t g t c a a t g t c t g t c a t g g c g
 g a g g t g g a c t g a t a t c t a g a

Amino acid sequence:

MDFQVQIFSFLLISASVIIARGQIVLSQSPAILASPGEKVTMTCRASSSVSYMHWY
 QQQPGSSPKPWYAPSNLASGVPARFSGSGSGTYSLTISRVEAEDAATYYCQQWS
 35 FNPPTFGAGTKLELKDGGSGGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
 TAYMQLSSLTSEDSA VYFCARV VYY SNSY WYFDVWGTGTTVSSDQPVPSTPPPT
 PSPSTPPTPSPSCCHPRLSLHRPALEDLLGSEAILTCLTGLRDASGVTFTWTPSSG
 KSAVQGPPDRDLCGYCYSVSSVLPGCAEPWNHGKTFCTAAYPESKTPLATLSKS
 40 GNTFRPEVHLPPPSEELALNELVLTCLARGFSPKDVLVRWLQGSQELPREKYLT
 WASRQEPSQGTTFAVTSILRVAADWKKGDTFSCMVGVHEALPLAFTQKTIIDRLA
 GKPTHVNVSVVMAEV D

18. 2H7 scFv VH L11S mIgA WH WCH2 T4 CH3

45 Nucleotide sequence:

aagcttgcggccatggatttcaagtgcagatttcagcttcgtcta atc agtgc t c a g t c a t a a t g c c a g a g g a c a a a t t g t c t c t
 cccagtc tcc a g c a a t c c t g t c g a t c t c c a g g g g a a g g t c a c a a t g a c t g c a g g g c c a g t c a a g t g t a a g t t a c a t g c a c t
 ggtaccacgc a a g c c a g g a g g a t c t c c c c c a a a c c c t g g a t t a t g c c c c a t c c a a c c t g g c t c t g g a g t c c c t g c t c g t c a g t g
 g c a g t g g g t c t g g g a c c t t a c t c t c a c a t c a g c a g a g t g g a g g c t g a a g a t g g c g g g c t g g g a t c t g g a g g a g g t g
 50 t a a c c c a c c a c g t c g g t g c t g g g a c c a a g g t g g g a g g c t g a a a g a t g g g g g g c t g g g a t c t g g a g g a g g t g
 g g a g c t c t c a g g c t t a c a g c a g t c t g g g g c t g a g g c t g c t g g g c c t c a g t g a a g a t g t c t g c a a g g c t c t g g c t

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5 acacatttaccaggtaaatatgcactggtaaaaggcagacacacctagacaggcctggaatggattggagcttatccaggaaatgtgatacttcctacaatcagaaggtaaaggccacactgactgttagacaatccctccagcacgcctacatgcagctcagc
10 agcctgacatctgaagactctgcggctattctgtcaagagtggtaactatagtaactctactgttacttcgtatgtctggggcaca
ggaccacggtcaccgtctctgtatcacatctgttctccactactctccacccfcccagccccagctgtcactgca
gcccgcactttgaggaccgtctgggtcagatgcgcacatcacatgtactgtcatggcctgagagatctgagggagctg
tcttcacctgggagccctccactggaaaggatgcagtgcagaagaaaagctgtcagaattccctgcggctgctacagtgtccagc
gtccgtccgtggctgtgtcgagcgcggacacagtggcgcacfcattcaagtgcacagttaccatctgtgatctgacaccctaactggc
acaattgccaaagtacagtgaacacccatccacccagggtccacccatgtaccggccgtcgaggagctggccctgaatgag
ctcggtccctgacatgcctggcgagcttcaaccctaaagaagtgcgtggcgatggctgcatgaaatgaggagctgtcccc
15 agaaagctacctagtgttgagccctaaaggagccaggcgaggcaccacccatgttgcgtacaagcgtgtgcgtgtatca
gctgaaatctggaaacagggtgaccgtactctgtcatggggccacgaggccctgccccatgaacttcacccagaagaccatcg
accgtctgtccggtaaaaccctaccaatgtcagcgtgtgtcatgtcagaggagattgataatcttagat

Amino acid sequence:

15 MDFQVQIFSLLISAVIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKGGGGGGGGGGGSSQAYLQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYNSYWYFDVWGTGTTVSSDHICSPPTTP
20 PPPSCQPSLQLRPALEDLLLGSADASITCTLNGLRDPEGAVFTWEPSTGKD
AVQNSCGCYSVSSLPGCAERWNSGASFKCTVTHPESDTLTGTIAKVTVNTFPPQV
HLLPPPSEELALNELVSLTCLVRAFPNPKEVLRWLHGNEELSPESYLVFEPLKEPGE
GATTYLVTSQLRVSAEIWKQGDQYSQCMVGHEALPMNFTQKTIDRLSGKPTNVSVS
VIMSEGD

A. mIgA WCH2 T4CH3

Nucleotide sequence:

Gttgtgatcacatctgtctccctactactcctccaccccttgcagccagccagctgtactgcagcgccagcttgg
30 cctgcctgggtcagatgccagcatcacatgtactctgaatggcctgagagatcctgagggagctgttccacctggagccctc
cactggaaaggatcgagtgcagaagaaagctgtgcagaattccgtcgctgtcacagtgttccagcgccgtgtgtgc
agcgttggaaacagtggcgcatcaagtgcacagtaccatcctgagtctgacacctaactggcacaattgccaaggtcaca
gtgaacacccatcccacccagggtccacctgttaccggccgtcgaggagctggccctgaatgagctgtgtccctgacatgg
35 tggcgcagcttcaaccctaaagaagtgttgtgcgtggctgcattggaaatgaggagctgtccctgaaaagctaccttagtgttgc
agccctaaaggagccaggcaggagggagccaccacccatgttgtgacaaagcgttgtcggtatcagctgaaaatctggaaaacagg
gtgaccagtagtccctgtcatgttgtggccacaggccatgttgcacacttcaccagaagaccatcgaccgtgtcggtttaacc
caccatgtcagcggtgtgtcatgtcagagggagaitgataatctagat

Amino acid sequence:

40 DHICSPPTTPPPSCQPSLQLRPALEDLLLGSASITCTLNGLRDPEGAVFTWEPST
GKDAVQKKAQNSCGCYSSVLPGCAERWNSGASFKCTVTHPESDTLTGTIAKV
TVNTFPQPQVHLLPPPSEELALNELVSLTCLVRAFNPKEVLVRWLHGNEELSPESYLV
VFEPLKEPGEATTYLVTSLRVSAEIWKQGDQYSQCMVGHEALPMNFTQKTIDRL
SGKPTNVSVSVMSEGDS

45 20. K322S CH₂ region

Nucleotide sequence:

cctgaactctggggggaccgtcagtcitcccttcccccaaaacccaaggacacctcatgatcccgaccctgaggtcac
atgcgtgtggtgacgtgagccacgaagaccctgaggtaagtcaactggtagtggacggcgtggaggtgcataatgcaa
gacaagccgcgggaggagcagtacaacacgacgtaccgtgtggtagcgtccctaccgtccgtcaccaggactggotgaatg
50 gcaaggagtacaagtgcgtctccaaacaaagccctcccagccccatcgagaaaacaatctccaaagccaaa

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Amino acid sequence:

PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCSVSNKALPAPIEKTIKAK

5

21. K322S CH2 WCH3

Nucleotide sequence:

cctgaactcctggggggaccgtcagtcitcccttcccccaaaaacccaaggacaccctcatgatctcccgaccccctgaggta
atgcgtgggtggacgtgagccacgaagaccctgaggtaactgtacgtggacggcgtggaggtaactatgcca
gacaaggatcacaagtgtccgtccaaacaaagccctcccgcccccattcggaaaacaatctccaaagccaaaggcagcc
cgagaaccacaggtgtacccctgccccatccggatgagctgaccaagaaccaggtaactgtggatcggta
cttctatcccagcgacatcgccgtggatggagagcaatggcagccggagaacaactacaagaccacgcctccctgtgg
actccgacggctccttctctacagcaagctcaccgtggacaagagcaggtggcagcaggaaacgtttcatgctccgt
atgcataggctcataccactacacgcagaagagcctccctgtccggtaaatgatctaga

10

15

Amino acid sequence:

PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCSVSNKALPAPIEKTIKAKG
20 QPREPVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPV
LSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

25

1. K322L CH2 WCH3

Nucleotide sequence:

tgatcaggagccaaatcttcgtacaaaactcacacatccccaccgcctcagcacctaactctggggggaccgtcagtc
cttcccccaaaaaccaaggacaccctcatgtctcccgacccctgaggtaactgtggatggacgtgagccacga
ccctgaggtaactgtacgtggacggcgtggaggtaactatgcca
gacaactgtaccgtgtggcagcgtccatccgtccgtaccaggactggtaatggcaaggaggtaactgt
gctccaaacaaagccaaaggcagcccgagaaccacaggtaactccctgccccat
ccggatgagctgaccaagaaccaggtaactccgtaccgtccgt
agagcaatggcagccggagaacaactacaagaccacgc
caccgtggacaagagcagggtggcagcaggaaacgtttcatgctccgt
gaagagccttcctgtccggtaaatgatctaga

30

35

Amino acid sequence:

DQEPKSSDKTHTSPPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHED
PEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCLV
SNKALPAPIEKTIKAKGQPREPVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVE
WESNGQPENNYKTPPVLDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHN
40 HYTQKSLSLSPGK

40

22. 2H7 scFv VHL11S hIgG1 (SSS-S)H K322SCH2 WCH3

Nucleotide sequence:

aagcttgcgcctatggatttcaagtgcagatttcagtcgtccgtataatcgttgttcgtcataatgtcc
cccagtcctccatgtctgcatctcccgaggggagaaggtaactgtc
ggtaccaggcagaaggccaggatcccccacccctggatttatgc
gcaggtaactgtccgtcacaatcgc
taaccacccacgttcggtgctggaccaagctggaggtaactgt
ggaggcttcaggcttacacgc
tacacatttaccaggatcaatgc
gactggtaaaggc
cagacaccatg
acagcaggcc
tggatggagg
tattatcc
caggaaat
ggtgataacttc
ctacaatc
agaaggta
aggcc
cacact
gactgt
tagaca
aaatc
ccctc
cagc
acgc
atgc
cagtc

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cagcctgacatctgaagactctgcggctattctgtcaagagtgggtactatagaactcttactggtaacttcgtatgtctggggcac
agggaccacggcacccgtctctgtcatcaggagccaaatctgcacaaaactcacatccccacgcctcagcacctgaact
cctgggggacgcgtcagttcttcccccaaaaccaaggacaccctcatgatctccggaccccgtgaggtaactgcgtgg
5 tggtgacgtgaggcacgaagaccctgaggtaactgttcaactgttgcacggcggtgaggtaactgcataatgccaagacaaggc
cgccggaggaggcgtacaacacgacgtaccgtgtggtcagcgtcaccgtcaccgcaccaggactggctgaatggcaaggag
tacaagtgcgtgtccacaacaaagccctccagccccatcgagaaaacaatctccaaagccaaaggcagccccgagaacc
caggtaacaccctgccccatccggatgagctgaccaagaaccaggtaacgcctgacgcctggtaaaggcttatccca
20 ggcacatcgcgtggagtgaggagcaatggcagccggagaacaactacaagaccacgcctccgtgctggactccgacgg
ctccttcctctacagcaagctcaccgtggacaaggcagcggcagcgggaaacgttctcatgcctgtatgcatgagg
10 ctgcacaaccactacacgcagaagagcctctccgtctccggtaaatgatctaga

Amino acid sequence:

MDFQVQIFSFLISAVIILARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWIYAPSNLASGVPARFSGSGSGTSLTISRVEAEDAATYYCQQWS
15 FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVVYSNSYWYFDVWGTGTTVTVSSDQEPEPKSSDK
THTSPPSSAPELLGGPSVFLFPFPKPKDTLMISRTPEVTCVVVDVSHEDEPKFNWYV
20 DGVEVHNAAKTPREEQYNSTYRVSVLTVLHQDWLNGKEYKCSVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQOPEN
NYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

23. 2H7 scFv VHL11S hIgG1 (SSS-S)H K322I.CH2 WCH3

25 Nucleotide sequence:
aagttgcgcgcattggatttcaagtgcagatttcagttccgtcatcgttcaggagggagaaggtaatgcacatttgcaggccatcgtaatgttacatgcact
cccaggctccaggcaatccgtctgcattcccgaggatccaaaaaccctggatttatgcacccatccaacctggctctggatccctgtcgccitcagtg
gttaccaggcagaagccaggatccaaaaaccctggatttatgcacccatccaacctggctctggatccctgtcgccitcagtg
30 gcaggtaggtctggacacttactcttcacaatcagcagactggaggctgaagatgcgtccacttattactgcacggcactggagtt
taaccacccacccgcgtccggctggaccaagctggagctgaaagatggcgggtcggcgtggatctggaggatctggaggatctggaggatctgg
ggagctctcaggatctacagcagactctggggctgagtcggtagggcctcagtgaaagatgcctgcaaggctctgc
40 tacacatttaccaggtaacaatatgcactggtaaagcagacacacttagacaggcctggatggaggatctggaggatctggaggaaat
ggtgataactccataatcagaatcagttcaagggcagggccacactgactgttagacaatctccagcacagcctacatgcagctcag
35 cagcctgacatctgaagactctgcggctattctgtcaagagtgggtactatagtaactcttactgttacttcgtatgtctggggcac
agggaccacggcacccgtctctgtatcaggagccaaatctgcacaaaactcacatccccacgcctcagcacctgaact
cctgggggacgcgtcagttcttcccccaaaacccaaaggacaccctcatgatctccggaccccgtgaggtaactgcgtgg
tggtgacgtgaggccacgaagaccctgaggtaactgttcaactgttgcacggcggtgaggtaactgcataatgccaagacaagg
45 cgccggggaggcgtacaacacgacacgtaccgtgtggtcagcgtcaccgtcaccgcaccaggactggctgaatggcaaggag
tacaagtgcgtgtccacaacaaagccctccagccccatcgagaaaacaatctccaaagccaaaggcagccccgagaacca
caggtgtacaccctgccccatccggatgagctgaccaagaaccaggtaacgcctgacccgttctcatgcctgttcaaggcgttcatccca
50 ggcacatcgcgtggagtgaggagcaatggcagccggagaacaactacaagaccacgcctccgtgctggactccgacgg
ctccttcctctacagcaagctcaccgtggacaagagcagcggcagcgggaaacgttctcatgcctgtatgcatgagg
ctctgcacaaccactacacgcagaagagcctctccgtctccggtaaatgatctaga

Amino acid sequence:

MDFQVQIFSFLISAVIILARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWIYAPSNLASGVPARFSGSGSGTSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGATLTVDKSSS
50 TAYMQLSSLTSEDSAVYFCARVVVYSNSYWYFDVWGTGTTVTVSSDQEPEPKSSDK

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THTSPPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCLVSNKALPAPIE
KTISKAKGQPREPQVTLPSSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQOPEN
NYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSL5
PGK

24. 2H7 scFv VHL11S hIgG1 (CSS-S)H K322SCH2 WCH3

Nucleotide sequence:

aagcttgcgcgcatggatttcaagtgcagatttcagttcctgtataatcgttgttgcact
10 cccaggctccagcaatcttcgtcatcgcaggatggagaaggcacaatgcacttgcagggccagctcaagtgttaacatgcact
ggtaccacgcagaaggcaggatctcccccacccctggatttgcgcctcaacccctggcttgcggagttccctgcgttgcgt
gcagtgggtctggacaccttactcttcataatcagcagatggggctgaagatgtccacttattactgcgcaggatggagtt
taaccacccacgttccgtgtggaccaagctggagctgaagatggggctggctggcggtgtggatctggaggaggtg
15 ggagcttcaggcttatctacagcagcttgcggctgagtcggctggcctggcctcagtgaaatgtccatgcaggatctggc
tacacatitaccaggatccaatatgcactggtaaaggcagacacccatggcgttgcataatggattggagcttacccaggaaat
ggtgatacttcataatcagaatgtcaaggccacactgcacttgcataatccctccagcacatgcacatgcaggatctgg
20 cagccctgacatctgaagactctgcggcttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgc
agggaccacggcgtaccgtcgcgtcgcgtcgcgtcgcgtcgcgtcgcgtcgcgtcgcgtcgcgtcgcgtcgcgtcgcgt
cctggggggaccgtcagtctcccttcccccaaaaacccaaaggacaccctcatgatccggacccctggcgttgcgcgttgc
25 tgggtggacgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgc
cgccggaggaggcagtacaacacgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgc
tacaatgtcgcgttccaaacaaaggcccccgc
caggtgtacaccctggccatccggatggctgacccatggcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgc
30 ggcacatcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgc
cgc
taymqlssltseedsavycarvyyysnsywfdvwgttvtvssdqeplscdk
35 thtsppssapeellggpsvflfppkpkdtlmisrtpevtcvvvdvshedpevkfnwv
dgvevhnaaktkpreeqynstyrsvltvlhqdwlngkeykcsasnkalpapiet
ktiskakgqpdpqvtlpssrdeltknqvsltclvkgfypsdiavewesngopen
nyktppvldsdgsfflyskltvdksrwqqgnvfscs svmhealhnhytqksls5
pgk

Amino acid sequence:

MDFQVQIFSLLISAVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
30 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGGSGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVIDFCARVYYYSNSYWFDVWGTTVTVDKSS
35 THTSPPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCSASNKALPAPIE
KTISKAKGQPDPQVTLPSSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGOPEN
NYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLS5
PGK

40 25. P331S CH2

Nucleotide sequence:

cctgaactcctggggggaccgtcagtcgttcccttcccccaaaaacccaaaggacaccctcatgatctccggacccctggaggtcac
atgcgtgtggggaccgtgagccacgaaggacccctggaggtcaagtcaacttgcgttgcgcgttgcgcgttgcgcgttgcgcgttgc
gacaaggccgcggaggaggcgtacaacacgcacgttgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgcgcgttgc
45 gcaaggaggatgtcaaggatccaaacaaaggccctccaggccatcgagaaaacaatctccaaaggccaa

Amino acid sequence

PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPASIEKTISKAK

50

26. P331S CH2 WCH3

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PCT/US2003/041600

Nucleotide sequence:

cctgaactcctgggggaccgtcagtcttccttcccccacaaacccaaggacaccctcatgatctccggaccctgaggtcac
atgcgttgtggacgtgagccagaagaccctgaggtaactgttacgtggacggcgaggtaataatgccaa
gacaagcccgccggaggaggcagttacaacacgacgtaccgtgtggtagcgcctcaccgtctgcaccaggactggotgaatg
5 gcaaggaggtaactgtcaaggctccaacaaagccctccacgcctccatcgagaaaacaatctccaaagccaaagggcagccc
cgagaaccacagggttacaccctgccccatccggatggactgaccaagaaccaggctgacgcctgaccctgctggtaaagg
cttctatcccgacatgcgcgtggatggagagcaatggcagccggagaacaactacaagaccacgcctccgtctgg
actccgacggctcttcctctacagcaagctaccgtggacaagagcaggtggcagcaggggaacgttctcatgtctccgt
atgcattgaggctgtcacaaccactacacgcagaagagcctccctgtccggtaatgatctaga

10

Amino acid sequence

PELLGGPSVFLPPPKDLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPASIEKTISKAKG
15 QPREPVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPV
LSDGSSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

27. 2H7 scFv VH L11S (SSS-S)H P331S CH2 WCH3

Nucleotide sequence:

aagcttgcgcctatggatttcaagtgcagatttcagcttcgtctaattcgtcactgtgttgcataattgcgcaggaggacaattgttctt
20 cccagtcctccatgcataatccgtctgcattcccgaggagaaggtaactgtcaggccatgcactgttgcaggccatgcactgttgcact
ggtaccaggcagaaggccaggatcccccacaaaccttgcgttatgcctccatccaaacctgttgcgttgcgttgcgttgcactgt
gcagtgggttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgtt
taaccaccccacgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgtt
25 ggagcttcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgtt
tacacatttaccaggtaataatgcacttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgtt
ggtgatacttcataatcagaagtcaaggccacactgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgtt
30 cagcctgtacatctgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgtt
agggaccacggcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgtt
cctggggggaccgtcacttcccttcccccacaaaccttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgtt
35 tgggtggacgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgtt
cgccggaggcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgtt
tacaagtgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgtt
cagggttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgtt
40 ggcacatgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgttgcgtt
tcttcctctacagcaagctaccgtggacaagagcaggtggcagcagggaaacactacaagaccacgcctccgtgactccgtacatgcgtt
ctctgcacaaccactacacgcagaagagcctccctgtctccggtaatgatctaga

Amino acid sequence

MDFQVQIFSFLLISAVIILARGQIVLSQPAILSASPGEKVMTCRASSSVSYMHWY
40 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSA VYFCARV V Y SNSYWYFDVWGTGTTVTVSSDQEPKSSDK
THTSPPSSAPELLGGPSVFLFPKPKDLMISRTPEVTCVVVDVSHEDPEVKFNWYV
45 DGVEVHNAAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPASIE
KTISKAKGQPREPVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPN
NYKTPPPVLDSDGSSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK
PGK

50

28. 2H7 scFv VH L11S (CSS-S)H P331S CH2 WCH3

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Nucleotide sequence:

aagcttgcgccatggatttcaagtgcagatttcagcttcgtctgtaatcagtgcgtcataattccagaggacaattttct
cccagtctccagcaatccgtctgcattccaggaaaggcacaatgacttcaggccagtcataatgcact
5 ggtaccacgagaaggccaggatcccccacaaacctggattatgcctccatccaacccgttctggagtcctgcgttcgt
gcagtggtctggacacttactcttcacaatcagcagatggaggctgaagatgcgtccacttattactgcctgcacgc
10 gagtttaacccacccacgttgcgtggaccaagctggagctgaaagatggcggtggctgggggtggatctggaggagtg
ggagcttcaggcttatcacagcactctgggctgagtcgtgaggcctggcctcgtgaagatgtctgcaggcttcgc
tacacattaccagttacaatatgcactggtaaagcagacacccatgacagggcctggaatggatggagcttattccaggaaat
15 ggtgatacttcctacaatcagaagttcaaggccacactgactgttagacaatccctcagcacagcctacatgcagtc
cagcctgacatctgaagacttcggcttattctgtcaagagtggtactatgtacttcgtatgtctgggcac
agggaccacggtcacccgtcttcgtatcaggagccaaatcttgacaaaactcacatccccacccgtcctcagcac
20 10 cctgggggaccgtcgtcttccttcctcccaaaacccaaaggacacccatgatctccggacccctgaggc
tggggacgtgagccacgaagacccgtggcaagttcaacttgtacgtggacggcgtggaggtgcataatgca
cgcggaggaggcgtacaacacgacgtaccgtgtggcagccgtcaccgtcaccaggactggc
15 15 tacaagtgcaggttccaaacaaagccctccacccctccatcggaaacaaatctccaaagccaaaggc
caggtgtacaccctgccccatccggatggactgaccaagaaccaggc
25 20 tggcgtcaccgtcaccgtggacaagggc
gcgacatccgtggagggagacaatggcagccggagaacaactaca
30 25 agaccacgcctccgtggactccgtcatgtccgtatgtccgtatg
ctcgccacaaccactacacgcagaagggc
20 Amino acid sequence
MDFQVQIIFSFLLISAVIIARGQIVLSQSPAILSASPGEKVTMTCRASSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
25 25 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVIDFCARVVYNSYWYFDVWGTGTTVSSDQEPEKSCDK
THTSPPSSAPELLGGPSVFLFPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPASIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQOPEN
30 30 NYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK.

29. T256N CH2 region

Nucleotide sequence:

35 Cctgaactcctggggggaccgtcagtcttccttcctcccaaaacccaaaggacacccatgatctccggaaaccctgaggta
catgcgtgggtggacgtgagccacgaagacccgtggcaactgttacgtggacggcgtggaggtgcataatgca
agacaaaggccggggaggaggcgtacaacacgacgtaccgtgtggcagccgtcaccgtcaccaggactggc
40 35 gtaatgcaccaaggactacaatgtcaaggcttccaaacaaaggccctccacccatcgagaaaacaatctccaaagccaa

Amino acid sequence

PELLGGPSVFLFPKPKDTLMISRNPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAIEKTISKAK

30. T256N CH2 WCH3

Nucleotide sequence:

45 cctgaactcctggggggaccgtcagtcttccttcctcccaaaacccaaaggacacccatgatctccggaaaccctgaggta
atgcgtgggtggacgtgagccacgaagacccgtggcaactgttacgtggacggcgtggaggtgcataatgca
gacaaaggccggggaggaggcgtacaacacgacgtaccgtgtggcagccgtcaccgtcaccaggactggc
50 45 gtaatgcaccaaggactacaatgtcaaggcttccaaacaaaggccctccacccatcgagaaaacaatctccaaagccaa
cgagaaccacagggttacaccctgccccatccggatggagctgaccaagaaccaggc
cttctatcccgacatcgccgtggagatggcagccggagaacaactacaagaccacgc
cttctatcccgacatcgccgtggagatggcagccggagaacaactacaagaccacgc

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actccgacggctcttccatcagaagctaccgtggacaagagcaggtggcagcaggggaacgtttcatgcctcgatgcataggctctgcacaaccactacacgcagaagagccctccctgtccggtaatgatctaga

Amino acid sequence

5 PELLGGPSVFLPPPKDLMISRNEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTSKAKG
QPREPQVTLPSSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPV
LSDGSSFLYSKLTVDKSRWQOGNVFSCSVMHEALHNHYTOKSLSLSPKG

10 31. 2H7 scFv VH L11S (SSS-S)H T256N CH2 WCH3

Nucleotide sequence:

15 aagttgccgcatggatttcaagtgcagatttcagcttcgtctaactgcgttcataattccagaggacaattttct
cccagtctccagcaatccgtctgcattccaggggagaaggcacaatgactgcagggccagctcaagttaagttacatgcact
ggtaccacgcagaagccaggatctccccaaaccctgatttatgccccatccaaacctggctctggagttccctgtcgctcagtg
gcagtgggtctggacacttactcttcacaatcagcagagttggaggctgaagatgcggccacttattactgcgcagcagtggaggtt
taaccccacccacgttccgtctggaccaagctggagctgaagatgcggctggctggcggttgttgcattttggaggaggf
ggagctcctcagcgttatctacagcagtcgtggctgagtcggtaggcctggccctcagtaagatgtccgtcaaggcatttgc
tacacatttaccaggatcacaatgtcactggtaaaggcagacacactagacagccctgaaatggattttggacttatttccaggaaaat
20 ggtgtatcttccatcacaatcagaagttcaaggcagggccacactgactgttagacaatctccagcagccatcatgcacgtcag
cagccgtacatctcagaagactctgggtctatttctgtcaagagttgtactatgtacttactgttgcgttgcattttggggc
aggaccacggcgtaccgtcttctgtatcaggagccaaatcttgcacaaaactcacacatccccaccgtccgtcagcac
cctggggggaccgtcagtttccctttcccccaaaaacccttcaaggacaccctcatgtatccggaaaccctgaggc
tgcacatgcgttgg
25 tgggtggacgtgagccacgaagacccttgggtcaagtcaacttggtagtggacggcgtggaggltgcataatgc
cgcgggaggaggcgttacacagcagcgttaccgtgtggcagtcctaccgtccgtcaccaggactggc
tgcataatggcaaggag
tacaaatgtcaagggtctccaacaaaggcccccagccccatcgagaaaacaatctccaaagccaaaggc
acagggtgtacaccctgccccatccggatgagctgaccaagaaccaggcgtcgc
20 acgttgcacatgcgttggagttggagagcataatggcagccggagaacaactacaagaccac
gcccctccgtgtggactccgac
30 gctcccttcccttacagcaagctaccgtggacaaggcagggtggcagcagggaaacgttctcatgc
tccgtatgcgttgcac
gctctgcacaaccactacacgcagaagaggcctccctgttccggtaaatgatctaga

Amino acid sequence

35 MDFQVQIFSFLLISAVIILARGQIVLSQSPAILSASPGEKVTMTCRASSVSYMHWY
QQKPGSSPKPWLYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
TAYMQLSSLTSEDAVYFCARVYYNSYWYFDVWGTGTTVSSDQEPKSSDK
THTSPPSSAPELLGGPSVFLFPPPKPKDTLMISRNPEVCVVVDVSHEDPEVKFNWY
VDGVEVIHNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
40 EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
NNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSL
SPGK

32. 2H7 scFv VH L11S (CSS-S)H T256N CH2 WCH3

45

Nucleotide sequence:

aagctgccgcatggatttcaagtgcagatttcagcttcgtctaactgcgttcgtcataattgccagaggacaattgttctt
cccagtctccagcaatccgtctgcattccaggggagaaggtcacaatgactgcagggccagctcaagtgttaagttacatgcact
ggtaccacgcagaagccaggatcccccacccctfgatttatgccccatccaaacctggctctggagttccctgtcgcttcagt
gcagtgggtctggacacttactctcacaatcagcagagtggaggctgaagatgtgcacttattactgcgcagcagtggagtt
taacccacccacccatgggtctgggaccaactggagctggatgtggatctggaggatgtgg

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ggagctctcaggcttatctacagcagtctggggctgagtcggtgaggcctgggcctcagtgaagatgtccgtcaaggcttgc
 tacacatttaccagttaacaatatgcactggtaaaggcagacacccatgacaggcctggaatggattggagttatccaggaaat
 ggtgatacttctacaatcagaagttcaagggcaaggccacactgacttagacaaaatcctccagcacagcctacatgcagctc
 5 aggcctgacatctgaagactctcgccgtctattctgtcaagagtggtaactatagtaacttactggacttcgtatggggcac
 caggaccacggtaccgtcttctgtacaggagccaaatctgtacaaaactcacacatccccaccgtccatgcacactgaact
 cctgggggaccgtcagtcttcccttcccccaaaacccaaggacaccctcatgatctccggaaaccctgaggtcacatgcgtgg
 tggtgacgtgagccacgaagacctgaggtcaagtcaactgttacgtggacggcgtggaggtgcataatgccaagacaaaagc
 10 cgccggaggaggcagttacaacacgtaccgttgcgtcaccgtccatgcaccaggactggctgaatggcaaggag
 tacaagtgcacaggctccaacaaaggcccccagccccatcgagaaaacaatctccaaagccaaaggcagccccgagaacc
 acagggttacaccctgcctccatccggatgagctgaccaagaaccaggcgtaccgtccatgcctggtaaaggcttcatcc
 agcgcacatcgccgtggagtgggagagcaatggcagccggagaacaactacaagaccacgcctcccggtcactccgacg
 15 gtccttcttcttctacagcaagcttaccgtggacaagagcaggtggcagcaggggaaacgttctcatgcctcgatgc
 gtcctgcacaaccactacacgcagaagagcgttccctgtccggtaaatgatctaga
 Amino acid sequence
 20 MDFQVQIFSFLLISAVIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
 FNPPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNQDTSYNQKFKGKATLTVDKSSS
 25 TAYMQLSSLTSEDSAVYFCARVVVYSNSYWYFDVWGTGTTVTVSSDQEPEPKSCDK
 THTPPSSAPELLGGPSVLFPPKPKDTLMISRNPEVTCVVVDVSHEDEPKFNWY
 VDGVEVHNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
 EKTISKAKGQPQREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGPE
 NNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSL
 SPGK:

33. RTPE/QNAK (255-258) CH2

Nucleotide sequence:

cctgaactctgggggaccgtcagtcttcttcccccaaaacccaaggacaccctcatgatctccagaacgcgtaaaggc
 30 atgcgttgtggacgtgagccacgaagaccctgaggtaagtcaactgttacgtggacggcgtggaggtgcataatgcca
 gacaaggccggggaggaggcagttacaacacgcacgtaccgttgcgtcaccgtccatgcaccaggactggctgaatg
 gcaaggaggatacaagtgcacaggctccaacaaaggcccccacgccccatcgagaaaacaatctccaaagccaa
 35 Amino acid sequence
 PELLGGPSVFLFPPKPKDTLMISQNAKVTCTVVVDVSHEDEPKFNWYVDGVEVHN
 AKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAK

34. RTPE/QNAK (255-258)CH2 WCH3

Nucleotide sequence:

cctgaactctgggggaccgtcagtcttcttcccccaaaacccaaggacaccctcatgatctccagaacgcgtaaaggc
 40 atgcgttgtggacgtgagccacgaagaccctgaggtaagtcaactgttacgtggacggcgtggaggtgcataatgcca
 gacaaggccggggaggaggcagttacaacacgcacgtaccgttgcgtcaccgtccatgcaccaggactggctgaatg
 gcaaggaggatacaagtgcacaggctccaacaaaggcccccacgccccatcgagaaaacaatctccaaagccaaaggc
 45 gggcggacccatccggatgagctgaccaagaaccaggcgtaccgtccatgcaccgtccatgcaccaggactggctga
 atgcgttgtggacgtgagccacgaagaccctgaggtaagtcaactgttacgtggacggcgtggaggtgcataatgcca
 actccgcacggcgtccatgcaccgttgcgtcaccgttgcgtcaccgtccatgcaccaggactggctgaatg
 atgcgttgtggacgtgagccacgaagaccctgaggtaagtcaactgttacgtggacggcgtggaggtgcataatgcca
 50 Amino acid sequence
 PELLGGPSVFLFPPKPKDTLMISQNAKVTCTVVVDVSHEDEPKFNWYVDGVEVHN
 AKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKG

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QPREPQVYTLPPSRDELTKNQVSLLTCLVKGFYPDSIAVEWESNGQPENNYKTPPPV
LDSDGSSFLYSKLTVDKSRWQOGNVFSCSVMHEALHNHYTOKSLSSLSPGK

35. 2H7 scFv VH L11S (SSS-S)H RTPE/QNAK (255-258)CH2 WCH3

5

Nucleotide sequence:

25

Amino acid sequence

MDFQVQIFSLLISAVIIARGQIVLSQSPAIIASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWIYAPSNLASGVPARFSGSGSGTYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQSGAESVRPGASVKMSCK
30 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
TAYMQLSSLTSEDASAVYFCARVVYYSNSYWYFDVWGTGTTVSSDQEPKSSDK
THTSPSSAPELLGGPSVFLFPKPKDTLMISQNAKVTCVVVDVSHEDPEVKFNWY
VDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
35 NNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSL
SPGK

36. 2H7 scFv VH L11S (CSS-S)H RTPE/QNAK (255-258)CH2 WCH3

Nucleotide sequence:

40 aagctgccgcatggattcaagtgcagatttcagcttccgtctaattcgtgcataattgccagaggacaattttctccc
ccccatccgcacatccgtctgcattcccgaaaaaccctggatttatgccccatccaaacctggctctggagtcacttgact
ggtaccagcagaagccaggatccctcccaaccctggatttatgccccatccaaacctggctctggagtcacttgact
gcagtgggtctggaccctactctcataatcagcagactggaggctgaagatgtgcacttattactgcacagcagtggagtt
taacccacccacgttcgggtctggaccagaactggagctgaaagatggcggtggtctggcgggtggatctggaggagtg
45 ggagctctcaggcttatctacagcagctgggtctggcggctgaggcctggccctcactgtgaagatgtcctgcacaggctctgc
tacacatttaccaatatgcactggfaaaggcagacacccatggcggctgaaatggattggacttacccaggaaat
ggtgatacttcctacaatcagaagttcaaggcaaggccacactgactgttagacaaatctccagcacagctcatgcagctcag
cagcgtgacatctgaagactctgcggcttattctgtcaagagtggtactatgtacttactgtacttcgtatgtctggggcac
50 agggaccacggtcaccgtctctgtatcggagccaaatctgtgacaaaactcacatccccccacgtcctcagcacctgaaat
cctgggggacgtcgttctcttcccaaaaacccaaggacacccatgtatctccagaaacgctaaggcatacgatgcgtgg
tggggacgtgagccacgaagaccctggatcactgtatcgttgcacggcgtggaggtgcataatgcacagacaaaacg

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cgcgggaggagcagtacaacagcacgtaccgtggtcagcgctccaccgcctgcaccaggactggctgaatggcaaggag
tacaagtgcaggctccaacaaagccctcccagccccatcgagaaaacaatctccaaagccaaaggcagcccccagaacc
5 acagggtacaccgtccccatccggatggactgaccaagaaccaggcagcgtacgcgtacccgtcaaggcttatccc
agcgacatcgccgtggagtgggagagcaatggcagccgagaacaactacaagaccacgcctccgtctggactccgacg
gtcccttcctctacagcaagctaccgtggacaagagcagggtggcagcaggggaactctcatgctccgtatgcatgag
getctgcacaaccactacacgcagaagagcctccctgtctccggtaatgatctaga

Amino acid sequence

MDFQVQIFSLLISAVIARGQIVLSQSPAILSASPGEKVMTCRASSSVSYMHWY
10 QQKPGSSPKPWIYAPSNLASGVPARFSGSGSTSLSRVEAEDAATYYCQQWS
FNPPTFGAGTKLEKDGGGSGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKTQPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSA VYFCARVVYYSNSYWYFDVWGTGTTVTVSSDQEPKSCDK
15 THTSPPSSAPELLGGPSVFLFPKPKDLMISQNAKVTCVVVDVSHEDPEVKFNWY
VDGVEVHNAAKTPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPQREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
NNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSL
SPGK

20 36. K290Q CH2 region

Nucleotide sequence:

cctgaactcctgggggaccgtcagtcitcccttcccccaaaacccaaggacaccctcatgatctccggaccctgaggtcac
atgcgtgggtggacgtgagccacgaagaccctgaggtcaagtcaactggtaactgtggacggcgtggaggtcataatgcca
gacacagccgcggaggaggcagttacaacacgtaccgtggcagcgtccaccgtccaccaggactggctgaatg
25 gcaaggaggactacaagtgcaggctccaacaaagccctccagccccatcgagaaaacaatctccaaagccaaa

Amino acid sequence:

11 PELLGGPSVFLFPKPKDLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTQPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAK

30

37. K290Q CH2 WCH3

Nucleotide sequence:

Cctgaactcctgggggaccgtcagtcitcccttcccccaaaacccaaggacaccctcatgatctccggaccctgaggfca
catgcgtgggtggacgtgagccacgaagaccctgaggtcaagtcaactggtaactgtggacggcgtggaggtcataatgcca
35 agacacagccgcggaggaggcagttacaacacgtaccgtggcagcgtccaccgtccaccaggactggctgaatg
ggcaaggaggactacaagtgcaggctccaacaaagccctccagccccatcgagaaaacaatctccaaagccaaaggcagcc
ccgagaaccacagggtgacaccgtccccatccggatgagctgaccaagaaccaggcagcgtaccgtccgtggcaag
40 gttctatcccgacatcgccgtggagtgggagagcaatggcagccggagaacaactacaagaccacgcctccgtctg
gactccgacggcgtcccttcctctacagcaagctaccgtggacaagagcagggtggcagcaggggaacgtctcatgtccgt
gatgcatgaggctgcacaaccactacacgcagaagagcctccctgtctccggtaatgatctaga

Amino acid sequence:

11 PELLGGPSVFLFPKPKDLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTQPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKG
45 QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQOPENNYKTPPV
LDSDGSSFLY SKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

38. 2H7 scFv VH L11S (SSS-S)H K290Q CH2 WCH3

Nucleotide sequence:

50 aagcttgcgcgcattttcaagtgcaggatttcagcttccgtcaatcgttgttcgtcataattgccagaggacaaattgtctct
cccgactccagcaatctgtctgcattccaggggagaaggcacaatgactgcaggccagctcaagtgttaatcatgcact

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5 ggtaccagcagaaggccaggatcccccacaaaccctggatttatgc(cc)atccaacctggcttgcggactccctgctcgcttcagtgc
gcagtgggtctgggacctctactctcacaatcagcagatggaggctgaagatgctgccatattactgcccagcagtggagtt
taaccaccccacgttcggctgggaccaagctggagctgaagatggcggctggcgggtggatctggaggaggtg
10 ggagctctcaggcttatctacagcagctggggctgagtcggtaggcctggccctcagtgaagatgtcctgcagcaggctctggc
tacacatttaccagttacaatatgcactggtaaaggcagacacctagacaggccctggaatggattggagctattatccaggaaat
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cagcctgacatctgaagactctggcttattctgtcaagagtggtfactatagtaactcttactgttacttcgtatgtctgggcac
15 agggaccacggtcaccgtcttctgtcaggagccaaatcttgcacaaaactcacatccccaccgcctcagcacactgaact
cctgggggaccgtcagttccctctcccccaaaacccaaggacaccctcatgtcctccggaccggcggcttgcgttgcacccgac
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acagggttacaccctggccatccggatggcgttgcaccaaccggcgttgcacccggcgttgcacccggcgttgcacccgg
20 acggcgttgcacccggcgttgcacccggcgttgcacccggcgttgcacccggcgttgcacccggcgttgcacccggcgttgcacccgg
tgcgttgcacccggcgttgcacccggcgttgcacccggcgttgcacccggcgttgcacccggcgttgcacccggcgttgcacccgg
asgytftsynmhwvkkqtprqglewigaiypngdtsynqfkkgatltvdksst
25 taymqlssltsedsaavyfcarvvyyssnsywfdvwgtgttvsvssdqepepkssdk
thtsppssapeellggpsvflppkpkdtlmisrtpevtcvvvvdvshedpevkfnwyv
dgvevhnaaktqpreeqynstyrvvsvltvlhqdwlngkeykckvsnkalapie
ktiskakgqprepqvylppsrdektqnqsvltclvkgfypsdiavewesngqpen
nyktppvldsdgsfflyskltvdksrwqqgnvfscsvmhealhnhytqkslsls
pgk.

30 39. 2H7 scfv VH L11S (CSS-S)H K290Q CH2 WCH3

Nucleotide sequence:

aagcttgcgcacatggatttcaagtgcagatttcagttccctgtaatcagtgcgtcgtcataattgcgcaggacaaattgttct
cccacgtctccacgttccatctgtctgcacatcccgaggagaaggcacaatgactgcaggccacgtcaagtgttacatgcact
35 ggtaccagcagaaggccaggatcccccacaaaccctggatttatgc(cc)atccaacctggcttgcggactccctgctcgcttcagtgc
gcagtgggtctgggacctctactctcacaatcagcagatggaggctgaagatgctgccacttattactgcccagcagtggagtt
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ggagctctcaggcttatctacagcagttctgggctgagtcggtaggcctggccctcagtgaagatgtcctgcagcaggctctggc
tacacatttaccagttacaatatgcactggtaaaggcagacacctagacaggccctggaatggattggagctattatccaggaaat
40 ggtatacttcctacaatcagaagtcaaggccacactgactgttagacaatccctcagcacagcctacatgcagctcag
cagcctgacatctgaagactctggcttattctgtcaagagtggtfactatagtaactcttactgttacttcgtatgtctgggcac
aggaccacggtcaccgtcttctgtatcaggagccaaatctgtgacaaaactcacatccccaccgcctcagcacactgaact
cctggggggaccgtcagttccctctcccccaaaacccaaggacaccctcatgtcctccggaccggcgttgcacccggcgttgcacccgg
tgggacgtgagccacgaagaccctgaggctcaagttcaactgttacgtggacggcgttgcacccggcgttgcataatgcacacacgc
cgccggggaggcagttacaacacggcgttccctccggatggcgttgcacccggcgttgcacccggcgttgcacccggcgttgcacccgg
tacaagtgcacgggtctccaacaaacccctcccgccatccggatggcgttgcaccaaggacaccggcgttgcacccggcgttgcacccgg
45 acagggttacaccctggccatccggatggcgttgcaccaaggacaccggcgttgcacccggcgttgcacccggcgttgcacccggcgttgcacccgg
gtccttcttcgttacagcagttccctccggatggcgttgcaccaaggacaccggcgttgcacccggcgttgcacccggcgttgcacccggcgttgcacccgg
gtccttcttcgttacagcagttccctccggatggcgttgcaccaaggacaccggcgttgcacccggcgttgcacccggcgttgcacccggcgttgcacccgg
50 gtccttcttcgttacagcagttccctccggatggcgttgcaccaaggacaccggcgttgcacccggcgttgcacccggcgttgcacccggcgttgcacccggcgttgcacccgg

Amino acid sequence:

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MDFQVQIFSLLISAVIARGQIVLSQSPAILSASPGEKVTMTCRASSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
5 TAYMQLSSLTSEDASAVYFCARVYYNSYWFVDVWGTGTTVSSDQEPKSCDK
THTSPPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYYV
DGVEVHNAKTQPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQOPEN
10 NYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

40. A339PCH2

Nucleotide sequence:

15 cctgaactctgggggaccgtcagtcttctctcccccaaaacccaaggacacctcatgtctccggaccctgaggtcac
atgcgtgggtggacgtgagccacgaagaccctgaggtcaagttcaactggtagtgacggcgtggagggtcataatgc
gacaaagccggggaggagcagtacaacagcacgtaccgtgtggtagcgtccaccgtccgtaccaggactggctgaatg
gcaaggagtacaagtgcacagggtctccaaagccctccagccccatcgagaaaaacaatctccaaaccca

Amino acid sequence:

20 PELLGGPSVFLFPPKPKDTLMSIRTPETCVVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEOYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKPK

41 A339P CH2 WCH3

25 Nucleotide sequence:

cctgaactcctgggggaccgcgtcagtcttctttcccccaaaacccaaggacacctcatgatctccggaccctgaggtcac
atgcgtgggtggacgtcgaccacgaagaccctgaggtaagtcaactggtagtgacggacggcggtggaggtaatgccaa
gacaaagccgcgggaggagcagtacaacagcacgtaccgtgtgtcagcgtccaccgtccgtaccaggactggctgaatg
gcaaggagtacaagtgcacaggctccaacaaagccctccagccccatcgagaaaacaatctccaaacccaaagggcagccc
cgagaaccacagggtacaccctgcggccatccggatgagctgaccaagaaccaggctgacccgtggtaaagg
cttctatccagcgacatcgccgtggagtggagagcaatggcagccggagaacaactacaagaccacgcctccgtgtgg
actccgacggcccttctccctacagcaagctaccgtggacaagagcaggtggcagcagggaaacgtttctcatgtccgtg
atgcatgaggctctgcacaaccactacacgcagaagagccctccctgtctccggtaaatgatctaga

35 Amino acid sequence:

PELLGGPSVFLFPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVGVEVHN
AKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKPKG
QPREPVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPV
LDSDGSFFLYSKLTVDKSRWQQGNVFSCVMHEALHNHYTQKSLSSLSPGK

42 3H7 scFv VHL11S (SSS-S)H A339P CH2 WCH3

Nucleotide sequence:

Nucleotide sequence:
 aagcttgcgcggatggattttcaagtgcaggattttcagcttcgttaatcagtgcgttcataatgcggcaggacaatttgtct
 ccccgactccaggcaatccctgtctgcattcccgaggagaaggtcacaatgacttgcaggccagtcaggtaatcatgcact
 ggttaccaggcaggatcccccacaaaccttggatttatgcggccatccaacctggcttgcggatccctgtcgcttcagg
 gcaggatgggtctgggacacttactcttcacaatcagcaggatggaggctgaagatgtgccacttattactgcaggcaggat
 taacccacccacgttcgggtctgggaccaaggctggaggctgaaaggatggcggtggctggcgggtggatctggaggagg
 ggaggcttcaggcttatcacagcaggatctgggtctggaggctggcggctcaggatgttgcaggcttcgg
 tacacatttaccaggtaacaatatgcactggtaaaggcagacacccatgacaggccgtgaatggattggagctattatcc
 caggaaatggtgatacttcataatcagaatgtcaaggccacactgtactgttagacaatcctccaggcacagccatgc
 gagctcaggatctgcggctatctgtcaggatgttgcgtactatgtactttactgttgcgttgcggcc

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PCT/US2003/041600

5 aggaccacggtcaccgtcttctgatcaggagccaaatctctgacaaaactcacacatccccaccgtctcagcacctgaact
cctggggggaccgtcagtcttcttcccccaaaacccaaggacaccctcatgatctccggaccctgaggtcacatgcgtgg
tggtgacgtgagccacgaagaccctgaggtcaigtcaactggtagtggacggcgtggaggtgcataatgccaagacaaagc
cgccggaggagcagtacaacagcacgtaccgtgtggtagcgtcaccgtccctgaccaggactggcataatggcaaggag
tacaagtgcagaagggtctccaacaaaggccctccagccccatcgagaaaacaatctccaaacccaaggcagccccgagaacc
acaggtgtacaccctgccccatcccggttagctgaccaagaaccaggtagcgtcaccgtccgtcaaggcttatccc
10 agcgacatcgcgtggagtggagagcaatggcagccggagaacaactacaagagaccacgcctccgtgctggactccgacg
gctccctctccctacagcaagctaccgtggacaagagcaggtggcagcagggaaacgtcttcatgctccgtgatgcatgag
gctctgcacaaccactacacgcagaagagcctccctgtctccggtaaatgatctaga

15 Amino acid sequence:
MDFQVQIFSLLISAVIARGQIVLSQSPAIIASPGEKVTMTCRASSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSSGGGSSQAYLQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
15 TAYMQLSSLTSEDAVYFCARVVYSNSYWYFDVWGTGTTVTVSSDQEPEPKSSDK
THTSPPSSAPELLGGPSVFLFPKPKDLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAAKTPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALAPIE
KTISKPKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQOPEN
20 NYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSL
PGK

43. 2H7 scFv VHL11S (CSS-S)H A339P CH2 WCH3

45 Amino acid sequence:

45 Amino acid sequence:
MDFQVQIFSFLLISAVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
50 FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYSNSYWYFDVWGTGTTVSSDQEPKSCDK
THTSPSSAPELLGGPSVFLPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV

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DGVEVHNNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKPKGQPREPQVTLLPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQOPEN
NYKTTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

5

44. G28-1VH

Nucleotide sequence:

10 gccgttcagctgcagcagtctggacactggaaaggctggcgcttcgtgaatgtttctgcaggctctggttactcattc
actggctacaatatgaactgggtgaagcagaataatggaaagagccttgactggattgaaatattgtfccttattatgggtacta
cctacaaccggaagttcaaggcaaggcacattgactgttagacaaatcctccagcacagcctacatgcagtcagatc
atctgaggactctgcagtcattactgtgcagatcggtcgccctatggactacttgggtcaaggAACCTCAGTCACCGTCTTCT
gatcag

15 Amino acid sequence:

AVQLQQSGPELEKPGASVKISCKASGYSFTGYNMNVKQNNNGKSLEWIGNIDPY
YGGTTYNRKFKGATLTVDKSSSTAYMQLKSLTSEDSAVYYCARSVGPMDYWG
QGTSVTVSSDQ

20 45. G28-1VL

Nucleotide sequence:

aagcttgcgcacatggtatccacagctcaggcttgggtgctgtgcgtggcttacaggcagatgtgacatccagatgact
agtctccagcctccatctgcacatgtggagagactgtcaccatcacatgtcaacaatgtaaaatgtttacatgtttggcttgt
atcagcagaaacaggaaatctcctcagtcgttgcaaaaaccitagcagaaagggtgtccatcaaggttcgttgca
gtggatcaggcacaacagtttctgtaaagatcagcagcgtcgacgttgcggatctgttgcacalcatccgataat
ccgtggacgttcggfggaggcaccgaactggagatcaaaggfggcggctggcgggtggggcggtggcggtggcggt
cgatcgta

Amino acid sequence:
30 MVSTAQFLGLLLWLTGGRCDIQMKTQSPASLSASVGETVTITCRTSENVYSYLA
WYQQKQGKSPQLLVSFAKTLAEGVPSRFSGSGSGTQFSLKISSLQPEDSGSYFCQHHS
DNPWTGGGTELEIKGGGGSGGGGSGGGGSS

35 46. G28-1 scFv

Nucleotide sequence:

aagcttgcggccatggatccacagctcgttcgggtgcgtgcgtggccatccaggatgcact
agtctccaggctccatatctgcatctgtggagagactgcaccatcacatgtcaacaatgt
atcagcagaaacaggaaaatctcctcagctcgtctttgcaaaaaccttagcagaagggt
gtggatcaggcacacagtttctctaagatcagcagccgcagcgttgcggccatccgataat
ccgtggacgttcggaggcaccgaactggagatcaaagggtggcggtggctcgccgg
cgtcagcggccatgcgcgcgcgttgcgtggaaaagcgcgcgcgttgcgttgc
catcactggctacaatatgaactgggtgaagcagaataatggaaagagccgc
actacctacaaccggaaagtcaaggcaggccacattgcactgttagacaat
gacatctgaggactctgcgttgcgttgcggccatggactactgggtcaagg
ttctgtatcag

Amino acid sequence:
50 MVSTAQFLGLLLWLTGGRCDIQMKTQSPASLSASVGETVTITCRTSENVYSYLA
YQQKQGKSPQLLVSFAKTLAEGVPSRFSGSGSGTQFSLKISSLQPEDSGSYFCQHHS
DNPWTECGGGTELEIKGGGGSGGGGSGGGGSSAVQLQSGPELEKPGASVKISCKA

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PCT/US2003/041600

SGYSFTGYNMNVKQNNNGKSLEWIGNIDPYYGGTTYNRKFKGATLTVDKSSST
AYMQLSLTSEDSAVYYCARSVGPMFYWGQGTSVTVSSDQ

5 **47. G28-1 VHL11S**

Nucleotide sequence:

gcggtcaggctgcagcgtctggacactgagtcggaaaaggccctggcgcttcagtgaagattccctgcaggcgttactcattc
actggctacaataatgaactgggtgaagcagaataatggaaagaggcccttgagttggaaatattgatccattatgggtacta
cctacaaccggaaggtaaggcaaggccacattgacttagacaatcctccagcacagcctacatgcagctcaagagtctgac
10 atctgaggactctgcagtctattactgtcaagatcggcggccctatggactactgggtcaaggaacctcagtcaccgtcttc
gatcag

Amino acid sequence:

15 AVQLQQSGPESEKPGASVKISCKASGY SFTGYNMNVKQNNNGKSLEWIGNIDPYY
GGTTYNRKFKGATLTVDKSSSTAYMQLSLTSEDSAVYYCARSVGPMFYWGQ
GTSVTVSSDQ

20 **48. G28-1 VHL11S scFv**

Nucleotide sequence:

aagcttgcgcgcattgttatccacagtcagttccctgggttgcgtgtggcttacagggtggcagatgtgacatccagatgactc
agtctccaggccctccatctgcatctgtggagagactgtcaccatcacatgcgaacaagtggaaatgttacagttttggcttgtt
atcagcagaaacaggaaaatctctcagtcctggctctttgcaaaaacccattagcagaagggtgtgccatcaagggtcagtggca
gtggatcaggcacacagtttctctgaagatcagcagcgcctgcagcctgaagattctggaaattttctgtcaacatcatcattccgataat
ccgtggacgttcggtgaggcaccgaactggagatcaaagggtggcggctggcgggtggcgggtggcggat
cgtcagcggccatgtcagcgtctggacactggcggcttcaggtaaggattccctgcaggcgttact
cattcactggctacaataatgaactgggtgaagcagaataatggaaagaggcccttgagttggaaatattgatccattatgggt
actacctacaaccggaaggtaaggcaaggccacattgacttagacaatcctccagcacagcctacatgcagctcaagagtct
30 gacatctgaggactctgcagtctattactgtcaagatcggcggccctatggactactgggtcaaggaacctcagtcaccgtctc
ttctgtatcag

Amino acid sequence:

35 MVSTAQFLGLLLLWL TGGRCDIQM TQPASLSASVGETVTITCRTSEN VSYLA W
YQQKQGKSPQLLVSFAKTLAEGVPSRFSGS GSGTQFSLKISSLQPEDSGSYFCQHHS
DNPWTFGGGTELEIKGGGSGGGGSGGGGSSAVQLQQSGPESEKPGASVKISCKA
SGYSFTGYNMNVKQNNNGKSLEWIGNIDPYYGGTTYNRKFKGATLTVDKSSST
AYMQLSLTSEDSAVYYCARSVGPMFYWGQGTSVTVSSDQ

40 **49. G28-1 scFv (SS-S)H WCH2 WCH3**

Nucleotide sequence:

aagcttgcgcgcattgttatccacagtcagttccctgggttgcgtgtggcttacagggtggcagatgtgacatccagatgactc
agtctccaggccctccatctgcatctgtggagagactgtcaccatcacatgcgaacaagtggaaatgttacagttttggcttgtt
atcagcagaaacaggaaaatctctcagtcctggctctttgcaaaaacccattagcagaagggtgtgccatcaagggtcagtggca
gtggatcaggcacacagtttctctgaagatcagcagcgcctgcagcctgaagattctggaaattttctgtcaacatcatcattccgataat
ccgtggacgttcggtgaggcaccgaactggagatcaaagggtggcggctggcgggtggcgggtggcggat
cgtcagcggccatgtcagcgtctggacactggcggcttcaggtaaggattccctgcaggcgttact
cattcactggctacaataatgaactgggtgaagcagaataatggaaagaggcccttgagttggaaatattgatccattatgggt
actacctacaaccggaaggtaaggcaaggccacattgacttagacaatcctccagcacagcctacatgcagctcaagagtct
50 gacatctgaggactctgcagtctattactgtcaagatcggcggccctatggactactgggtcaaggaacctcagtcaccgtctc
ttctgtatcagtcaggagccaaatctctgacaaaactcacatccccaccgtctcagcacctgacactcctgggggaccgtc

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agtcttccttccccccaaaacccaaggacaccctcatgatctccggaccctgaggtcacatgcgtgggtggacgtgagcc
acgaagaccctgaggtcaagttaacttgtacgtggacggcggtggaggtgcataatgccaagacaagccgcggaggagca
gtacaacacgtaccgtgtgtcagcgtcaccgtcctgcaccaggactggctgaatggcaaggaggfacaagtgcagaaggc
5 tccaacaaagccctccagccccatcgagaaaacaatctcaaagccaaagggcagccccgagaaccacagggtgtacaccct
gccccatccggatgagctgaccaagaaccaggctcagcgtaccgtcaaggctatccagcgcacatgcgcgt
gagtgggagagcaatggcagccggagaacaactacaagaccacgcctccgtgcgtggactccgacggcgtcttctctac
agcaaggtcaccgtggacaagagcaggcaggcagcagggaaacgtctctatgctcgtatgcgtgaggctctgcacaaccact
acacgcagaagagccctccctgtctccggtaaatgatctaga

10 Amino acid sequence:

MVSTAQFLGLLLLWLTGGRCDIQMTQSPASLSASVGETVTITCRTSENVSYLAW
YQQKQGKSPQLLVFAKTLAEGVPSRFSGSQGTQFSLKISSLQPEDSGSYFCQHHS
DNPWTFGGGTELEIKGGGGSGGGGGSSAVQLQQSGPELEKPGASVKISCKA
15 SGYSFTGYNMNWKQNNGKSLEWIGNIDPYYGGTTYNRKFKGKATLTVDKSSST
AYMQLKSLTSEDSAVYYCARSVGPMDYWGQGTSVTVSSDHDQEPKSSDKTHTSP
PSSAPELLGGPSVFLPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVE
VHNAAKTPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISK
AKGQPREPVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKT
TPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

20

50. G28-1 scFv IgAW H IgG1WCH2 WCH3

Nucleotide sequence:

aagcttgcgccatggatccacagctcagttccctgggttgtcgtctgtggcttacagggtggcagatgtgacatccagatgactc
agtctccagcctccatatctgcattgtggagagactgtcaccatcacatgcgaacaagtaaaaatgttacagtattttggcttgtt
25 atcagcagaaacaggaaaatctccatgcctcgtgttttgcaaaaaaccttagcagaaggtgtgccatcaagggtcattggca
gtggatcaggcacacagtttctctgaagatcagcagcgcgtcgcaggacttgcggatgttttgcggatgttttgcggatgttttgc
ccgtggacgttccggggcaccgaactggagatcaaagggtggcggggcgttgcggatgttttgcggatgttttgcggatgttttgc
cgtcaggccgtccagctgcagcgtctggacgtggaaaaggctggcgttcagtgaagatgttgcggatgttttgcggatgttttgc
cattcactggctacaatataactgggtgaagcagaataatggaaagagccttgagttggatgttttgcggatgttttgcggatgttttgc
30 actacctaaccggaaagtcaaggcAACATTGACTTAGACAAATCTCCAGCACGCCATATGCAGCTCAAGAGTCT
gacatctgaggactctgcgttcttactgtcaagatcggcggccctatggactactggggtaaggaaacctcagtccacgttc
ttctgtatcagccaggatccctcaactccacccatctccctcaactccacccatctccctatgcgcacccatgttgc
ggggaccgtcgttcccttcccccggggccggatgttttgcggatgttttgcggatgttttgcggatgttttgcggatgttttgc
gacgtggccacgaagaccctggatgttcaactggatgttgcggacggcgtggaggtgcataatgccaagacaaccggc
35 ggaggaggcgttacacacgcacgtaccgtgtggtcagcgtccaccgtcctgcaccaggactggctgaatggcaaggatgttgc
gttcaagggtctccaaacaaaggcccccggatgttgcggatgttgcggatgttgcggatgttgcggatgttgcggatgttgc
tgtacaccctggcccccgttccggatgttgcggatgttgcggatgttgcggatgttgcggatgttgcggatgttgcggatgttgc
catgcgcgtggagttggagagcaatggcaggccggagaacaactacaagaccacgcctccgtgttgcggatgttgcggatgttgc
40 tttcccttacagcaagctcaccgtggacaagagcaggcggatgttgcggatgttgcggatgttgcggatgttgcggatgttgc
cacaaccactacacgcagaagagccctccctgtctccggtaaatgatctaga

40 Amino acid sequence:

MVSTAQFLGLLLLWLTGGRCDIQMTQSPASLSASVGETVTITCRTSENVSYLAW
YQQKQGKSPQLLVFAKTLAEGVPSRFSGSQGTQFSLKISSLQPEDSGSYFCQHHS
DNPWTFGGGTELEIKGGGGSGGGGGSSAVQLQQSGPELEKPGASVKISCKA
45 SGYSFTGYNMNWKQNNGKSLEWIGNIDPYYGGTTYNRKFKGKATLTVDKSSST
AYMQLKSLTSEDSAVYYCARSVGPMDYWGQGTSVTVSSDQPVPSTPPSPSTPPT
PSPSCAPELLGGPSVFLPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDG
VEVHNAAKTPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISK
50 SKAKGQPREPVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNY

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KTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPG
K

51. G28-1 scFv VHL11S (SSS-S)H WCH2 WCH3

5 Nucleotide sequence:

aagcttgcgcattgttatccacagctcagttccctgggtgctgtgtggcttacagggtggcagatgtgacatccagatgactc
agtctccagccctccatctgcattgtggagagactgtcaccatcacatgtcaacaagtggaaaatgttacagttatggcttgg
atcagcagaaacaggaaaatcttcctcagtcctggctctttgcaaaaaccttagcagaagggtgcccataagggtcagtggca
gtggatcaggcacacagtttctgaagatcagcagcctgcagcctgaagatttgcgaaggatatttgcataacatcattccgataat
ccgtggacgttcggggaggcaccgaactggagatcaaagggtggcggtggctggcgggtggctgggggtggcgggat
cgtcagcggccatctgcagcgtctggacactgtcgagtcggaaaagcctggcgttcagtgtcaagatatttgcataagggttgg
cattcactggctacaatatgaactgggtgaaggcagaataatggaaagggccttgagtggattggaaatattgtcattatgg
actacatcacaaccggaaagttcaaggcacaatttgcactgttagacaatccctcagcagcctacatgcagtcagatc
gacatctgaggactctgcattactgtcaagatcggcggccatgtgactactgggtcaaggaaacctcagtcaccgtc
ttctgtatcaggagccaaatcttcgtacaaaactcacaatccccaccgtcctcagcaccgtgaaactctgggggaccgtc
ccttcctcccccacccaaaggcaccatcatgtatctccggacccctgaggatcactgtgggtggggaccgtc
gaccctgaggtcaagtcaactgttgcgtggacccgtggaggtgcataatgcataaggcacaaggccggggagg
cagcagctaccgtgtgtcagcgtcctcaccgtcctgcaccaggactggctgaatggcaaggatcataatgc
aaaggccctcccaagcccccattcagaaaaacaatccaaagccaaaggccggccgagaaccacagg
atcccgatgagctgaccaagaaccaggcagcctgaccgttgcacccgttgcataaggcttcatcc
gagagcaatggcagccggagaacaactacaagaccacgcctccgtctggactccgacggc
ctcaccgtggacaagaggcaggtggcagcaggaaacgttctcatgtcgtatgc
agaagagcctccctgtctccggtaatgtatcaga

25 Amino acid sequence:

MVSTAQFLGLLLWL TGGRCDIQMTQSPASLSASVGETVT CRTSENVSYLAW
YQQKQGKSPQLLVSFAKTLAEGVPSRFSGSGTQFSLKISSLQPEDSGSYFCQHHS
DNPWTFGGGTELEIKGGGSGGGGSGGGSSAVQLQQSGPESEKPGASVKISCKA
SGYSFTGYNMNWVKQNNGKSLEWIGNIDPYGGTINYRKFKGKATLTVDKSSST
30 AYMQLKSLTSEDSAVYYCARSVGPMYWGQGTSTVSSDHQFPKSSDKTHTSP
PSSAPELLGGPSVFLPPPKDITLMISRTPEVTCVVVDVSSEDPEVKFNWYVDGVE
VHNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAIEKTISK
AKGQPQREPQVYTLPPSDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKT
TPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPK

35

52. G28-1 scFv VHL11S (CSS-S)H WCH2 WCH3

Nucleotide sequence:

aagcttgcgcattgttatccacagctcagttccctgggtgctgtgtggcttacagggtggcagatgtgacatccagatgactc
agtctccagccctccatctgcattgtggagagactgtcaccatcacatgtcaacaagtggaaaatgttacagttatggcttgg
atcagcagaaacaggaaaatcttcctcagtcctggctctttgcaaaaaccttagcagaagggtgcccataagggtc
gtggatcaggcacacagtttctgtcaagatcagcagcgtcagcgttgcacccgttgcataatgc
ccgtggacgttcggggaggcaccgaactggagatcaaagggtggcggtggctggcgggtgggtgggggg
cgtcagggttcagtcagcagctgtggacactgtggaaaaggcctggcgttc
cattcactggctacaatatgaactgggtgaaggcagaataatggaaagggc
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gacatctgaggactctgcagttactgtcaagatcggcggccatgtgact
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ccttcctcccccacccaaaggcaccatcatgtatccggacccct
gaggatcactgtggatcaccatgcgtgggtggacgtgagcc
gaccctgaggatcagttcaactggtacgtggacccgtgg
cataatgcacaaggcacaaggc
cagcagctaccgtgtgtcagcgtcctcaccgtc
caccaggactggcgttgcataatgc
agaagccctcccaagcccccattcagaaaaacaatcc
aaaggccaaaggcagccccc
gagaaccacagg
caggtgtacaccctgcccc

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atccggatgagctgaccaagaaccaggcagctgcgttgcataaaggcttatcccagcgacatgcgtggatgg
gagacaatggcagccggagaacaactacaagaccacgcctccgtctggactccgacggcttccttacagcaag
ctaccgtggacaagagcagggtggcagcaggaaacgtctcatgtccgtatgcatgaggcttgacacaaccactacacgc
agaagagctctccctgtctccggtaaatgtatcaga

5

Amino acid sequence:

MVSTAQFLGLLLLWLTGGRCIDIQMTQSPASLSASVGETVTITCRTSENVSYLAW
YQQKQGKSPQLLVSFAKTLAEGVPSRFSGSGSGTQFSLKISSLQPEDSGSYFCQHHS
DNPWTFGGGTELEIKGGGGSGGGGSGGGGSSAVQLQQSGPESEKPGASVKISCKA
10 SGYSFTGYNMNWVKQNNNGKSLEWIGNIDPYGGTTYNRKFKGKATLTVDKSSST
AYMQLKSLTSEDSAVYYCARSVGPMDYWGQGTSVTVSSDQEPKSCDKTHTSPPSS
APELLGGPSVFLFPKPKDLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVH
NAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAK
15 GQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPP
VLDSDGSFFLYSKLTVDKSRWQOGNWFSCSVMHEALHNHYTOKSLSLSPGK

53. G28-1 scFv VH L11S (CSC-S)H WCH2 WCH3

Nucleotide sequence:

20 aagttgccgcatggtatccacagctcaggcttgggtgctgctggcitacaggcggcagatgtgacatccagatgact
agtctccagcctccatatctgcatactgtggagagactgtcaccatcacatgtcgaacaagtgaaaatgttacagttattggcttgtt
atcagcagaaacagggaaaatctccatgcagctctggctttgcaaaaacccatgcagaagggtgtccatcaagggttcagtgcca
gtggatcaggcacagcttctgtgaagatcagcagcctgcagcctgaagattctggagttattctgtcaacatcattccgataat
ccggacgttcggggaggcaccgaactggagatcaaagggtggcggtggctggcggtggggcggtggcggt
ctcagcggtccagctgcagcagtcggacactgcaagatgttctgcagtttgcagatgttact
cattcactggctacaataatgtaaactgggtgaagcagaataatggaaagagccctgagttggaaatattgtatccittattatggtgtt
actacactacaaccggaaagtcacaggcaaggccacaftgactgttagacaatctccagcacagctcatgcagtcagatcaaggatct
gacatctgaggactctgcagtcattactgtcaagatcgteggccctatggactactgggtcaaggaacctcagtcacccgtctc
ttctgtcaggagccaaatctgtgacaaaactcacatctccaccgtgtcagcaccgtgactctgggtggaccgtcagtc
ctctccccccaaaacccaaaggacaccctcatgtctccggaccctgaggtcacatgcgtgtggacgtgagccacgaag
30 accctgaggtaagtcaactggtagtgcggacggcgtggaggtgcataatgccaagacaaaggccggggaggcagtc
accacgtaccgtgtggtagcgtccatccaccgtcaccaggactggctgaatggcaaggagtacaagtgcacccgttcaaca
aagccctcccgccccatcgagaaaacaatctccaaagccaaaggcagcccgagaaccacagggtacaccctgcccc
tcccggttagcgtaccaagaaccaggctcagcctgcacccgttcaaggcttatccaagcgcacatgcgtggagtg
gagagcaatggcagccggagaacaactacaagaccacgcctccgtctggactccgacggcttctccctacagcaag
35 ctcaccgtggacaagagcaggtagcggcagcagggaactcttcatgcctcgtatgcacggctctgcacaaccactacacgc
agaagagcctccctgtccggtaaatgtatcaga

Amino acid sequence:

MVSTAQFLGLLLWLTGGRCIDIQMKTQSPASLSASVGETVTITCRTSENVSYLAW
YQQKQGKGSPQLLVSFAKTLAEGVPSRFSGSQSGTQFSLKISSLQPEDSGSYFCQHHS
DNPWTFGGGTELEIKGGGGSGGGGSGGGSSAVQLQQSGPESEKPGASVKISCKA
SGYSFTGYNMNWVKQNNGKSLEWIGNIDPYGGTTYNRKFKGKATLTVDKSSST
AYMQLKSLTSEDSAVYYCARSVGPMDYWGQGTSVTVSSDQEPKSCDKHTSPPC
SAPELLGGPSVFLFPKPKDTLMISRTPEVTCVVVDVSHEDPEVFKFNWYVDGVEV
45 HNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKA
KGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTP
PVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

50 54. G28-1 scFv VH L11S (SSC-P)H WCH2 WCH3

Nucleotide sequence:

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aagcttgcgccatggtatccacagctcagttccctgggtgctgtgtggcttacaggggcagatgtgacatccagatgactc
 agtctccagccctccatctgcattctgtggagagactgtcaccatcacatgtcaacaagtaaaatgttacagtttttgcttgg
 atcagcagaaacaggaaaatcttcagtcgttgcggcttgcgg
 5 ctggatcaggeacacagtttctctgaatgcagcggcgcggcggcggcggcggcggcggcggcggcggcggcggcggcggcgg
 ccgtggacgttcgg
 cgtcagcgg
 cttcactggctacaataatgaactgggtgaagcagaataatggaaagggcggcggcggcggcggcggcggcggcggcggcgg
 10 actacctacaaccggaaagtcaaggcggcggcggcggcggcggcggcggcggcggcggcggcggcggcggcggcggcggcgg
 gacatctgaggactctgcgttactgtcaagatcggtcgccctalggactactggggtcaaggaaacctcagtcggcgtc
 ttctgtatcaggagccaaatcttcgtacaaaactcacatccccccatcccgtccgcggcggcggcggcggcggcggcggcgg
 cttccctcccccgg
 15 ggg
 atcccgggatgagctgaccaagaaccaggcggcggcggcggcggcggcggcggcggcggcggcggcggcggcggcggcgg
 gagagcaatgggcgg
 ctcaccgtggacaagagcgg
 20 Amino acid sequence:
 MVSTAQFLGLLLLWLTGGRCDIQMTQSPASLSAVGETVTITCRTSENVSYLAW
 YQQKQGKSPQLLVFAKTLAEGVPSRFSGSQGTQFSLKISSLQPEDSGSYFCQHHS
 DNPWTFGGGTELEIKGGGGGGGGGGGGSSAVQLQQSGPESEKPGASVKISCKA
 SGYSFTGYNMNWVKQNNGKSLEWIGNIDPYYGGTTYNRKFKGKATLTVDKSSST
 25 AYMQLKSLTSEDSA VYYCARSVGPMWDYWGQGTSVTVSSDQEPKSSDKTHSPPCP
 APPELLGGPSVFLFPPKPKDTLMISRTPETCVVVVDVSHEDPEVKFNWYVDGVEVH
 NAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIKTISKAK
 GQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTIIPP
 VLDSDGSFFLYSKLTVDKSRWQQGNVFSCVMHEALHNHYTQKSLSLSPGK
 30

II. 54. HCTLA4 HIGG1 (SSS-S)H P238SCH2 WCH3

Nucleotide sequence:

atggcttgccttggatttcagcggcacaaggctcagtcgttgcggcggcggcggcggcggcggcggcggcggcggcggcggc
 atccctgttcttcgttgcggc
 35 gtatgcattccaggc
 aacctacatgcggggatgatgttgcggcggcggcggcggcggcggcggcggcggcggcggcggcggcggcggcggcggc
 ccaaggactgaggggccatgg
 caacgg
 40 cggc
 cctgg
 gcataatgccaaggcgg
 actggcgttgcggc
 45 ctggc
 tccctggactccgg
 catgttgcgg
 50

Amino acid sequence:

MACLGQQRHKQLNLAAARTWPCTLLFIPVFCKAMHVAQPAVVLAGSRGIAS
 FVCEYASPGKATEVRVTVLQRADSQTEVCAATYMTGNELTFLDDSICTGTSSGN

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5 QVNLTIQGLRAMDTGLYICKVELMYPPIYLGIGNGTQIYVIDPEPCPDSQPKSSDKHTSPPSSAPELLGGSSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

55. Fe2-2 VL

Nucleotide sequence:

10 gttgttaagctggccatggattcacaggcccaggttcatgttactgtctatgggtatggtaacctgtgggacattgtatgc
tcacagtctccatctccctagctgtcagtggagagaaggttctatgagctgcaagtccagtcagcctttatataatcacaat
caaaaagaactacttggcctgttaccagcagataccaggcgactctctaaactgtgttacttggcatccacttagggaatctgg
ggccctgtatcgcttcacaggcagtggtatctggacagatttcacttcaccatcagcagactgtaaaggctggcgttta
ttactgtcagcaattatacctatctccacgttcggagggtggcaccaagctggaaataaagggtggcggtggctcggcggtg
15 gtgggtcgggtggcgccggagctcg

Amino acid sequence:

MDSQAQVLMLLLWVSGTCGDIVMSQSPSSLAVSVGEKVSMSCKSSQSLLYNHN
QKNYLAWYQQIPGQSPKLLIYWASTRESGVPDFRTGSGSGTDFLTISRVKAEDLA
VYYCQOYYTYPPTFGGGTKLEIKGGGGSGGGGSGGGGSS
20

56. EC2-2VH

Nucleotide sequence:

25 Gggagctcgagggtgcagtgtgaaggaggtcaggacccgtggggccctcactggactgtccatcacatgcaccgttcagggttctcaattaaaccgtcatgtgttaactgggttcggccaggccctccaggaaagggtctggactggctggatgtatgggtatggaaggcacaactataattcaactcgactcatcgatcagaaggacaactccaagagccaagtttctaaaaaggactacatcacaactgtacacacagccaggtaactgtgccagagatcactatgttaccactatgtatggactactgggggtcaaggacacctcagtccatccgttcgtatcgat

30 Amino acid sequence:

GSSQVQLKESGPLVAPSQSL SITCTVSGFSLTVYGVNWVRQPPGKGLDWLGMIW
GDGSTDYN SALKSRLSISKD NSKSQVFLKMDSLQTDDTARYYCARDHYGTHYAM
DYWGQQGT STVSSDQ

35 57. FC2-2scFv

Nucleotide sequence:

gttgttaagctggccatggattcacaggcccaggtttatgttactgctgtatgggtatctggacactgtatgg
tcacagtctccatcctccctagctgtcagttggagagaaggltctatgagctgcaagtccagtcagcccttatataatcacaat
caaaaagaactacttgcctgttaccagcagataccaggcagttctctaaactgtgttacttgcattactggcatccactaggaaatctgg
40 ggtccctgategottcacaggcagtggtatggacagattctaccatcagcagactgtgaaggctgaagacctggcagttt
ttactgtcagcaattatatacctatcctccacgttcggaggltggcaccaagctggaaataaaagggtggcggtggctcgggccccgg
gtggggtcggtggcgccggagctctcaggtcagttgaaggagtcaaggaccctggctgtggccctcacagacgctgtcc
atcacatgcaccgtctcagggtctcattaaccgttatggttactgggtcgccagccctcaggaaagggttgactggactggctgg
45 gaatgatatgggtgatggaaagcacagactataattcagctctcaaatccagacttgagcatcagtaaggacaactccaagagccaa
gtttctaaaaatggacagtctacaaactgtatggacacagccaggactactgtgccagagatcactatggatccactatgtatgg
actactgggtcaaggaacctcagtcaccgtctcctgtatgg

Amino acid sequence:

50 MDSQAQVLMLLLWVSGTCGDIVMSQSPSSLAVSVGEKVSMSCKSSQSLLYNHN
QKNYLAWYQQIPGQSPKLLIYWASTRESGVPDFRTGSGSGTDFLTISRVKAEDLA
VYYCQQYYTYPPTFGGGTKLEIKGGGGSGGGSGGGSSQVOLKESGPLVAPSQ

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SLSITCTVSGFSLTVYGVNWVRQPPGKGLDWLGMIWGDGSTDYN SALKSRLSISK
DNSKSQVFLKMDSLQTDDTARYY CARDHYGTHYAMDYWQGT SVTVSSDQ

58. FC2-2 VHL11S

5 Nucleotide sequence:

gggagcttcagggtcaggtaaggagtcaggacccatggctcggtggccctcacagagcgttccatcacatgcaccgttcag
ggttcttattaaaccgttatggttactgggttcgcgcaggccctcaggaaagggtctggactggctggaaatgatatgggtgtatg
gaagcacagactataattcagtcataatccagactgagcatcagaaggacaactccaagagccaagttttctaaaaatggaca
gtctacaaaactgtacacagccaggtaactgtgccagagatcaactatggtacccactatgtatggactactgggcaaggaa
10 cctcaggcgttccatgtatgg

Amino acid sequence:

(GSS)QVQLKESGPGSVAPSQSLITCTVSGFSLTVYGVNWVRQPPGKGLDWLGMI
WGDGSTDYN SALKSRLSISK DNSKSQVFLKMDSLQTDDTARYY CARDHYGTHYAMDYWQGT SVTVSSDQ

59. FC2-2 VH L11S scFv

Nucleotide sequence:

gttgttaagcttgcgcacatggattcacaggcccagggttactgtctatgttactgtctatggatctgttgcacattgtatg
20 tcacagtcctccatcctccatgtgtcagggttgcaggagaagggttctatgagctgcaggccatccatcataatcacaat
caaaagaactacttgcgcgttaccaggcagataccaggccaggcttccatcactgtctatgttgcacattgttgcaggatctgg
ggtccctgtatcgccttacaggcagggttgcaggatcttcacttcaccatcaggcaggatgttgcaggatctggacttgcaggatctgg
ttactgtcaggcaatattatcctatcctccatgttgcagggttgcaccatcaggatgttgcaggatctggacttgcaggatctgg
gtgggtcgggtggcggcgggagtcctcagggttgcaggatgttgcaggatctggacttgcaggatctggacttgcaggatctgg
25 atcacaatgcaccgttcagggttctatcaggatgttgcaggatgttgcaggatctggacttgcaggatctggacttgcaggatctgg
gaatgatatgggtgtatggaaagcacagactataattcagtcataatccagactgagcatcagaaggacaactccaagagccaa
gttttctaaaaatggacagtcataactgtatggacacagccaggtaactgttgcaggatctggacttgcaggatctggacttgcaggatctgg
actactgggtcaaggaaacctcaggatgttgcaggatgttgcaggatctggacttgcaggatctggacttgcaggatctgg
30 Amino acid sequence:
MDSQAQVLMLLLWVSGTCGDIVMSQSPSSLAVSVGEKVSMSCKSSQSLLYNHN
QKNYLAWYQQIPGQSPKLLIYWASTRESGVPDFRTGSGSTDFTLTISRVKAEDLA
VYYCQQYYTYPPTFGGGTKLEIKGGGGGGGGGGSSQVLKESGPGSVAPSQ
35 SLSITCTVSGFSLTVYGVNWVRQPPGKGLDWLGMIWGDGSTDYN SALKSRLSISK
DNSKSQVFLKMDSLQTDDTARYY CARDHYGTHYAMDYWQGT SVTVSSDQ

60. FC2-2 (SSS-S)H WCH2 WCH3

Nucleotide sequence:

gttgttaagcttgcgcacatggattcacaggcccagggttactgtctatgttactgtctatggatctgttgcacattgtatg
40 tcacagtcctccatcctccatgtgtcagggttgcaggagaagggttctatgagctgcaggccatccatcataatcacaat
caaaagaactacttgcgcgttaccaggcagataccaggccaggcttccatcactgtctatgttgcaggatctggacttgcaggatctgg
ggtccctgtatcgccttacaggcagggttgcaggatcttcacttcaccatcaggcaggatgttgcaggatctggacttgcaggatctgg
ttactgtcaggcaatattatcctatcctccatgttgcagggttgcaccatcaggatgttgcaggatctggacttgcaggatctgg
gtgggtcgggtggcggcgggagtcctcagggttgcaggatgttgcaggatctggacttgcaggatctggacttgcaggatctgg
45 atcacaatgcaccgttcagggttctatcaggatgttgcaggatctggacttgcaggatctggacttgcaggatctggacttgcaggatctgg
gaatgatatgggtgtatggaaagcacagactataattcagtcataatccagactgagcatcaggatgttgcaggatctggacttgcaggatctgg
gttttctaaaaatggacagtcataactgtatggacacagccaggtaactgttgcaggatctggacttgcaggatctggacttgcaggatctgg
actactgggtcaaggaaacctcaggatgttgcaggatctggacttgcaggatctggacttgcaggatctggacttgcaggatctgg
50 cagcaccctgtactcctgggtggaccgttgcaggatcttccttcccccaaaacccaaaggacaccctcatgtatcccggaccctgag
gtcacatgcgtgggtggacgttgcaggccacgaagaccctgaggtaactgttgcaggatctggacttgcaggatctggacttgcaggatctgg
gccaaagacaaagccgcgggaggagcaggtaacacagcacgttgcaggatcttcctcaccgttgcaccaggactgg

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5 gaatggcaaggagtacaagtgcacaggcttccaaacaagccctcccagccccatcgagaaaaccatctccaaagccaaaggc
agcccccagaaccacaggtgtacaccctgccccatcccgggatgagctgaccaagaaccaggctgacgctgcctgcgtca
aaggcttatccaaggcacatgcgcgtggagtggagagcaatggcagccggagaacaactacaagaccacgcctccgtg
ctggactccgacggcttccttcctacagcaagctaccgtggacaagagcaggtggcagcagggaaacgtttcatgctc
cgtatgcatgaggctgcacaaccactacacgcagaagagccctccctgtccggtaatgtataga

Amino acid sequence:

10 MDSQAQVLMLLLWVSGTCGDIVMSQSPSSLAVSVGEKVSMSCKSSQSLLYNHN
QKNYLAWYQQIPGQSPKLLIYWASTRESGVPDFRTGSGSTDFTLTISRVKAEDLA
VYYCQQYYTPPTFGGGTKLEIKGGGGSGGGGGGGSSQVQLKESGPGLVAPSQ
SLSITCTVSGFSLTVYGVNWVRQPPGKGLDWLGMIWGDGSTDYNALKSRLSISK
DNSKSQVFLKMDSLQTDDTARYYCARDHYGTHYAMDYWGQGTSVTVSSDQEPK
SSDKTHTSPPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKF
NWYVDGVEVHNAAKTPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKA
15 LPAPIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESN
GQPENNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCVMHEALHNHYTQ
KSLSLSPGK

61. FC2-2 VHL11S (SSS-S)H WCH2 WCH3

20 Nucleotide sequence:
gttgttaagcttgcgcgcattggattcacaggcccaggttctatgtttactgctgtatggtatctggtacctgtgggacattgtatg
tcacagtctccatcctccctagctgtcagttggagagaaggttctatgagctgcaagtccagtcagagccattataatcacaat
caaagaactacttggcgtggaccaggcagataccaggcagttctctaaactgcgtattttactggcatccactaggaaatctgg
gttccctgtatgcgttccacaggcagttggatctgggacagatctacttcaccatcagcagactgaaggctgaagacctggcagttt
ttactgtcagcaataitatacctatcccccacgttccggaggtggcaccagtcgttgcaccaagtcgttgcaccaatgggatggcgttgc
gtgggtcgggtggcgggggagcttcagggtcagttgcaccaatgggtttactgggttcgcaccccttcaggaaagggtctggactggctgg
atcacatgcaccgtctcagggttctcattaaccgtcatgggttaactgggttcgcaccccttcaggaaagggtctggactggctgg
gaatgatatgggtgatggaaagcacagactataaltcagctctcaatccagactgagcatcagtaaggacaactcaagagccaa
gttttctaaaaatggacagtctacaactgtatggacacaggcaggactactgtgcaccaatggtacccactatgtatgg
actactgggtcaaggaaacctcagtcaccgtctctgtatcaggagccaaatcttcgtacaaaactcacatccccaccgtct
cagcacctgaactctgggtggaccgtcagttctcttcctccaaaacccaaggacaccctcatgtatcccgacccctcgag
gtcacatgcgtgtgggtggacgttgagccacgaagaccctgaggtaacttcactggtagtggacggcgtggaggtgcataat
gccaagacaaagcccgccggaggaggcagttacaacacgcacgtaccgtgtggcagcgtccaccgtctgcaccaggactggct
gaatggcaaggaggataactgtcaagggttccaaacaagccctcccgccatcgagaaaaccatctccaaagccaaaggc
35 agcccccagaaccacagggttacaccctgccccatcccggtatcgactgaccaagaaccaggctgacccctgacccctgtca
aaggcttatccaaggcacatgcgtggagttggagagcaatggcagccggagaacaactacaagaccacgcctccgtg
ctggactccgacggcttccttcctacagcaagtcaccgtggacaagagcaggtggcagcagggaaacgtttcatgctc
cgtatgcatgaggctgcacaaccactacacgcagaagagccctccctgtccggtaatgtataga

40 Amino acid sequence:
MDSQAQVLMLLLWVSGTCGDIVMSQSPSSLAVSVGEKVSMSCKSSQSLLYNHN
QKNYLAWYQQIPGQSPKLLIYWASTRESGVPDFRTGSGSTDFTLTISRVKAEDLA
VYYCQQYYTPPTFGGGTKLEIKGGGGSGGGGGGGSSQVQLKESGPGLVAPSQ
SLSITCTVSGFSLTVYGVNWVRQPPGKGLDWLGMIWGDGSTDYNALKSRLSISK
DNSKSQVFLKMDSLQTDDTARYYCARDHYGTHYAMDYWGQGTSVTVSSDQEPK
SSDKTHTSPPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKF
NWYVDGVEVHNAAKTPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKA
45 LPAPIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESN
GQPENNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCVMHEALHNHYTQ
KSLSLSPGK

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62. UCHL-1 VH

Nucleotide sequence:

atggccaggcttacttttcattcctgcactgttgcattgtccatgtccctcccagattactgtaaaggagtcggccctggatctt
5 gcagccctcccaagaccctcagtctgacttgttctctgggittactgaccacttatggataggtaggtggattcgcaccc
ccagggaaagggtctggatggctgacacacattggtaatgataaaactataacacagccctgaggagccggctcacaa
tctccaaggattcctaacaaccaagtactcctaagatcgccaaatgtggacactgcagataccgccacatactactgtctacg
gctacacttactggggcaaggactctggtaactgtctcgca

Amino acid sequence:

10 MGRLTSSFLLIVPAYVLSQITLKESGPGILQPSQLSLTCFSFGSLSFTTYGIGVGWIR
QPPGKGLEWLTHIWWNDNKYYNTALRSRLTISKDSSNNQVLLKIANVDTADTAT
YYCLYGYTYWGQGTLTVSA

63. UCHL-1 VL

15 Nucleotide sequence:

atgaaggccctgttaggctgttggctgatgttctggattcctgttccatcagtgtatgttgcacccaaactccactctccctgc
ctgtcagtcgttggagatcaggccatcttcgtcagatctgtcagacccatcttacagataatggaaacacccatatttacatggatct
gcagaaggccaggccatctccaaaactcctgtatcacaacttccaaaccgatttctggggcccagacaggctcagtggcagtg
atcaggagacagatttacactcaagatcagcagatggaggctgaggatctggagttattctgtctcaaagtacacatgtccg
20 tggacgttcgggtggaggccaccaagctggaaatcaa

Amino acid sequence:

MKLPVRLVLMFWIPASIDVVMTQTPLSLPVSLGDQASISCRSSQSLLYSNGNTYL
HWYLQKPGQSPKLLIYKLSNRFSGPDRFSGSGSGTDFTLKISRVEAEDLGVYFCS
25 QSTHVPWTFGGGTKLEIK

64. UCHL-1 scFv

Nucleotide sequence:

30 gitgtaagctggcccatgaaggccgtttaggcgtgtggatgtgttctggattcctgttccatcagtgtatgttgcacccaaactccactctccctgc
aaactccactctccctgcgtcagtcgttggagatcaggccatcttcgtcagatctgtcagacccatcttacagataatggaaac
acttattacattggatctgcagaagccaggccatctccaaaactcctgtatcacaacttccaaaccgatttctggggcccaga
caggttcatggcagtggatcaggagacagatttacactcaagatcagcagatggaggctgaggatctggagttattctgtc
tcaaagtacacatgttccgtggacgttcgggtggaggccaccaagctggaaatcaaagatgggggtggctgggggtggatct
ggaggagggtggagctcagattactctgaaagagtcgttccctggatcttcgcagccctccacaccctcagtctgacttgttct
35 tctctgggtttactgaccacttatggataggtaggtggattcgtcagcctccaggaaaggctggatggctgacacacat
ttggatgataataactataacacgcccggctcacaatcctaaggatccctcaacaaccaacttact
caagatcggccaatgtggacactgcagatccacatactactgtctcactggctacactacttactggggcaaggactctggta
ctgtctctgtcatca

40 Amino acid sequence:

MKLPVRLVLMFWIPASIDVVMTQTPLSLPVSLGDQASISCRSSQSLLYSNGNTYL
HWYLQKPGQSPKLLIYKLSNRFSGPDRFSGSGSGTDFTLKISRVEAEDLGVYFCS
QSTHVPWTFGGGTKLEIKDGGGGGGGGGGSSQITLKESGPGILQPSQLSLTC
45 FSGFSLTTYGIGVGWIRQPPGKGLEWLTHIWWNDNKYYNTALRSRLTISKDSSNN
QVLLKIANVDTADTATYYCLYGYTYWGQGTLTVSAD

65. UCHL-1 VH I11SL12S

Nucleotide sequence:

50 gggagtcgtcagattactctgaaagagtcgtggccctggatctgcagccctccagaccctcagtctgacttgttctctgggttt
tcactgaccacttatggataggtaggtggattcgtcagcctccaggaaaggctggatggctgacacacatttggtaat

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gataataagtactataacacagccctaggagccggcataatctccaaggattcctcaacaaccagaactactccctaagatgc
caatgtggacactgcagataccgccacatactactgtctctacggctacacttactggggccaaggactctggtactgtctctgct
gtatca

5 Amino acid sequence:

(GSS)QITLKESGPQSQSQTLSLTCFSFGSLTYGIGVGWIRQPPGKGLEWLTHIW
WNNDNKYYNTALRSRLTISKDSSNNQVLLKIANVDTADTATYYCLYGYTYWGQGT
LVTVSAD

10

66. UCHL-1 scFv VH L11S

Nucleotide sequence:

15 Nucleotide sequence:
gttgttaagctggccatgaagtgcgttaggctgtggatgttctggattctgtccatcgtatgtgtgtatgacc
aaacctccactctccatgcgtcagtcgtggagatcaggccatctctgcagatctagtcagagccatccatcgtatgtgtgtatgaaac
acctatttacatggtacatcgagaagccaggccatgtctccaaaactctgtatcacaactttcaaccgattttctgggtcccaga
cagggttcagtggcgtggatcaggacagatccacactcaagatcagcagatcgtggaggctgaggatctggagttatctcgtc
tcaaaagtacacatgttccgtggacgttcgtggaggccccaagctggaaatcaaagatggcgtggctcggcgggtggatct
ggaggagggtggagatctcagattactctgaaagatcgtggccatggcgtggatctccacccctccacaccctcgtctgacttgc
tttctctgggtttactgaccacttatgtataggatggatgtggatcgtcagcctccaggaaaggctggatgtgtgacacac
20 atttggtgaaatgataataagtactataacacagccctgaggagccggcgtcacaatctcaaggatctccaaacaaccaagtgactc
ctcaagatcgcataatgtggacactgcagataccgccacatactactgtctcgtcgtacacttactgtggccaaaggactctgg
actgtctctgtatca

Amino acid sequence:

25 MKLPVRLVLMFWIPASISDVVMTQTPLSLPVSLGDQASISCRSSQSLLYSNGNTYL
HWYLQKPGQSPKLLIYKLSNRSGVPDRFSGSGSGTDFTLKISRVEADLGVYFCS
QSTHVPWTFGGGTKLEIKDGGGSGGGGSGGGGSSQITLKESGPSSQPSQLSLLC
SFSGFSLTTYGIGVGWIRQPPGKGLEWLTHIWWNDNKYYNTALRSRLTISKDSSNN
QVLLKIANVDTADTATYYCLGYTYWGOGTLVTVSAD

30

67. UCH1₋₁ scFv (SSS-S)H WCH2 WCH3

Nucleotide sequence:

35 gtgttaagcttgcgcatgaagtgcgttaggctgtggctatgttctggattccatcgtatgtttgtatgaccc
aaactccactccctgcgtcagtcttgagatcaggcctccatcttcgcagatctagtcagagcctttacagtaatggaaac
acctattacatggfaccgcagaagccaggccagtcctccaaaactctgtatcacaactttcaaccgatttctgggtcccaga
cagggtcagtggcagtggatcaggcacagatttcacacicaagatcagcagactggaggctgaggatctggagttattctgc
tcaaagtacacatgtccgtggacgtcggggaggccaaagctgaaaatcaaagatggcggtggctgggggtggatct
ggaggaggfggagctctcagattactctgaaagagctgtggccctggatctgcagccctccagaccctcagtcgtacttgtt
40 tctctgggtttcactgaccactatgtataggtaggttggattcgtcagccctccaggaaagggtggatctggacacacat
ttggfagaatgataataagtactataacacagccctgaggagccggcacaatctccaaggatcttccaaacaaccacttcc
caagatcgcctatgtggacactgcagataccgcacatactactgtctcgtacggctacacttactggggcaagggactctgg
ctgtctcgtatcaggagccaaatcttgcacaaaactcacacatccccaccgtccfcagcacctcagactctgggtggacc
cagtcttcccttccccccaaaacccaaggacaccctcatgtatcccgaccctgaggtcacatgcgtggfggacgtgagc
45 caagacccctgaggtaagttcaactggtagtggacggcgtggaggtgcataatgccaagacaagccggggaggagca
gtacaacacgcacgtaccgtgtggcagcgtccaccgtccfcaccaggactggatgccaaggactacaagtgcacagg
tccaacaaagccctcccgcccccattcgagaaaaccatctccaaagccaaagggcagccccgagaaccacagggtacacc
ccccccatccggatgagtcaccaagaaccaggcgtccgtaccgtccgtcaaggcttcatccaagcgacatgcgt
gagtggggagagcaatggcagccggagaacaactacaagaccacgcctccgtcgtggactccgacggccttctctac
50 agcaagctcaccgtggacaagagcaggtggcagcggggaaacgttctcatgtccgtatgcgtatgaggcctgcacaacc
acacgcagaagacccctccctgtctccggtaatgatctaga

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Amino acid sequence:

5 MKLPVRLVLMFWIPASISDVMTQTPLSLPVSGLDQASISCRSSQSLLYSNGNTYL
HWYLNQKPGQSPKLLIYKLSNRFSGVPDFRGSGSGTDFTLKISRVEAEDLGVYFCS
QSTHVPWTFGGGTKLEIKDGGGSGGGGSGGGGSSQITLKESGPGLQPSQLS廖CS
FSGFSLTTYGIGVGWIRQPPGKGLEWLTHIWWNDNKKYYNTALRSRLTISKDSSNN
QVLLKIANVDTADTATYYCLYGYTYWGQGTLVTVSADQEPKSSDKTHTSPPSSAP
ELLGGPSVFLFPKPKDLMISRTPEVTCVVVDVSHEDPEVFKFNWYVDGVEVHN
A
10 KTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQ
PREPVQYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVL
DSDGSFFLYSKLTVDKSRWQQGNVFSCVMHEALHNHYTQKSLSLSPGK

68. UCHL-1 scFv VHL11S (SSS-S)H WCH2 WCH3

15 Nucleotide sequence:

gttgttaagctggccatgaagtgcctgttaggctgtggctgatgttctggattctgcctccatcagtatgtttgtatgacc
aaactccactctccctgcctgtcagtcgtggagatcaggcctccatctctgcagatctagtcagagccctttacagaatggaaac
acctatttacatgttacatgcagaagccagccagtcataaaaactcttccaaaccgattttctggggcccca
caggttcagtgccagtggtacaggacagatttcacactcaagatcagcagactggaggctgaggatctgggagttattctgc
tcaaaatgttccgtggacgttcggaggcaccaagctggaaatcaaaatgtggcggtggctggccgtggatct
ggaggagggtggagcttcagattactctggaaagagtctggccctggagctccagccctccagaccctcagtcactgttgc
tttctctgggtttcaactgaccactatgtttaggatgttggatctgcagccctccagggaaagggtctggagtggctgacacac
attttgttggaaatgataataacttataacacagccctgaggagccggcacaatcttcaaggattcttcaacaaccaagaatc
ctcaagatcgcacatgttggacactgcagataccgcacatactactgttctacggctacacttactggggccaagggactctgg
actgttctcigcgtatcaggagccaaatcttgcacaaaactcacatccccaccgttccagcacctgtaaactctgggtggacc
tcagtcctcttccccccaaacccaaaggacaccctcatgtatctccggaccctgaggcactatgcgtgggtggacgtgag
ccacgaagaccctgaggtcaagtcaactggtagctggacggcgtggaggtgcataatgcacaaagccgcgggaggagc
agtacaacagcactgttggcgttgcacgcgttccaccgttgcaccaggactggctgaatggcaaggagttacaatgtcaaggt
cttccaaacaagccctcccgccccatcgagaaaaccatcttcaaaaggccagcccccggagaaccacagggttacacc
tgccccatccccggatgagctgaccaagaaggcaggcgttccggatgttccatcgttccatccatccatccatccatccat
ggagtgggagagcaatggcagccggagaacaactacaagaccacgcctccctgttgcactccgcacggcttccatccat
cagcaagctaccgtggacaagagcaggcagggtggcagcagggaacgttccatgttccgttgcacggcttccatccat
ctacacgcagaagacccatccctgttccgggaaatgttgc

35 Amino acid sequence:

MKLPVRLLVLMFWIPASISDVVMTQTPLSLPVSLGDQASISCRSSQSLLYSNGNTYL
HWYLNQPGQSPKLLIYKLSNRFSGVPDRFGSGSGTDFTLKISRVEAEDLGVYFCS
QSTHVPWTFGGGTKLEIKDGGGSGGGGSGGGSSQITLKESGPQSQPSQLSLTC
SFSGFSLTTYGIGVGWIRQPPGKGLEWLTHIWWNDNKYYNTALRSRLTISKDSSNN
40 QVLLKIANVDTADTATYYCLYGTYWGQGTLTVSADQEPKSSDKTHTSPPSSAP
ELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYDGVEVHNA
KTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQ
PREPVQVTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVL
DSDGSFFLYSKLTVDKSRWQOGNVFSCSVMHEALHNHYTOKSLSLSPGK

69, 5B9 VH L11S

Nucleotide sequence:

50 gggagctctcaggcgcagtcgaagcagtcaggacctggcgtcagtgcagtcctcacagagccgtccatcacctgcacagtctctg
gtttcttattaaactacccatgtctgtacactgggtcgcgcagtcgtccaggaaagggtctggagtggctggagtgatatggagtgggg
aatcacagactataatgcagcttcatatcccgactgagcatcacaageacgattccaagagccaaatgtttaaaatgaacagt

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tgcaacacctaatgacacagccattttactgtgccagaatgggggtgataactacccttaatactatgctatggactactggggtcaaggaaacctcagtccacgcgtccctcag

Amino acid sequence:

- 5 (GSS)QVQLKQSGPGSVQSSQLSITCTVSGFSLTTYAVHWVRQSPGKGLEWLGV
WSGGITDYNAAFISRLSITKDDSKSQVFFKMNSLQPNDTAIYYCARNGGDNYPYY
YAMDYWGGQGTSVTVSS

10 73. 5B9 VH L11S scFv

Nucleotide sequence:

aagcttgcgcgcatgaggitctgtcagttctgggctgtgtgcgtccatggatccactgcagatattgtatgcga
ggctgcattctcaatccagtcactcttggaaacatcagcgttccatctccgtcaggcttagtaagacttcctacatgtatggcatca
cttatttgtatgttatctgcagaagccaggccagtcctcagtcctgttattcagatgtccaaccctgcctcaggagtcctccagaca
15 gttcagtagcagtgggtcaggaactgattcacactcgagactcagcagactggaggctgaggatgtgggtgttattactgtgcctc
aaaatctagaacttccgcgtcacgttcgggtcgtggaccacgtggactgtggaaacgggggtggcggtggctggccgggtgggg
cggtggccggggagcttcgtcagggtcagactcgagactcagtgccatcactgcgttccatcacact
gcacagtctgtttctcaattactacactatgtgtacactgggtcgccagtcctccagaaagggtctggagtggtctggagtgat
20 atggagtggtgaaatcacagactataatgcagcgttccatccagactgagcatccaaggacgttccaagagccaagtttctt
aaaatgaacactctgcacactatgacacagccatttactgtgtccagaaatgggggtgataactacccttattactatgtatgg
ctactgggtcaaggaacctcagtcaccgtcctcag

Amino acid sequence:

25 MRFSAQLLGLLVWIPGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLLHSNGITY
LYWYLQKPGQSPQLIYQMSNLASGVPDFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKRGGGGGGGGGGGGGSSQVQLKQSGPGSVQSSQSLI
TCTVSGFSLTTYAVHWVRQSPGKGLEWLGVIWSGGITDYNAAFISRLSITKDDSKS
QVFFKMNSLQPNDTAIYYCARNGGDNYPYYYAMDYWGOGTSTVSS

30

70. 5B9 scFv VHL11S (SSS-S)H WCH2 WCH3

Nucleotide sequence:

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Amino acid sequence:

5 MRFSAQQLGLLVWIPGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLLHSNGITY
LYWYLQKPGQSPQLLIYQMSNLASGVPDFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKRGGGSGGGGSGGGSSQVQLKQSGPGSVQSSQSLSI
10 TCTVSGFSLTTYAVHWVRQSPGKGLEWLGVIWGGITDYNAAFISRLSITKDDSKS
QVFFKMNSLQPNDTAIYYCARNGGDNYPYYYAMDYWGGQGTSVTVSSDQEPKSS
DKTHTSPPSSAPELLGGPSVFLFPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNW
YVDGVEVHNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPA
PIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQP
ENNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLS
LSPGK

15 76. 2H7 scFv VH L11S (SSS-S)H P238SCH2 WCH3

Nucleotide sequence:

20 aagcttgcgccatggatttcaagtgcagatttcagcttcctgtaatcagtgcgttcagtcataattgc
cccagtcctccagcaatccctgtctgcacatcccgaggagaaggcacaatgcacttgc
ggtaccacgcagaaggcaggatcccccacccctggatttatgcacccatccaac
gcgtgggtctggcacccctttactcttcacaatcagcagatggaggctga
taaccacccacgttcgggtctggaccacatggggatgc
25 ggatcttcaggcttatctacagcagtcggggctgagtcgg
tacacattfaccagttacaatatgcactggtaaa
ggtagtacttcataatcagaatgtcaagg
30 cggaccacggtcacgcgttcatttctgtca
cgtggggatcgtc
tggtggacgtgagccac
35 tacaatgc
acagggttaccc
acggacatcg
gtcc
40 MDFQVQIFSFLLISASVIIARGQIVLSQSPAILSASPGEKVMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYYYNSYWYFDVWGTGTTVSSDQEPKSSDK
THTSPPSSAPELLGGSSVFLFPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
45 NYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLS
PGK

Amino acid sequence:

5 MDFQVQIFSFLLISASVIIARGQIVLSQSPAILSASPGEKVMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQFKKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYYYNSYWYFDVWGTGTTVSSDQEPKSSDK
THTSPPSSAPELLGGSSVFLFPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
50 NYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLS
PGK

78. 2H7 scFv VH L11S (SSS-S)H WCH2 WCH3

Nucleotide sequence:

50 aagcttgcgccatggatttcaagtgcagatttcagcttcctgtaatcagtgcgttcagtcataattgc
cccagtcctccagcaatccctgtctgcacatcccgaggagaaggcacaatgcacttgc
caggccagtcataatgcacttgcgtggcagcggcagtc

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5 ggtaccagcagaaggccaggatcccccacccctggattatgcggcatccaacctggctctggagtcctgctcgctcagtg
gcagtggctggacacttactctcacaatcagcagatggaggctgaagatgtccacttaatctgcagcagtggagtt
taacccacccacgttggctggaccaagctggagctgaaagatggcggtggctggcgggtggatctggaggaggt
ggagctcctaggcttatctacagcagctggggctgagtcggtagggcctggcctcagtgaaagatgtccatgcaggcttcgc
tacacatttaccagttacaatatgcactgggtaaagcagacaccatggcctggaaatggatggagctattatccaggaaat
ggtgatacttcataatcagaagttcaaggccaggccacactgacttagacaatccctcagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcggctattctgtcaagatgggtactatagtaacttactgttacttcgatgtctgggcac
agggaccacggtcaccgtctctgtcaggagccaaatcttgacaaaactcacatccccaccgtcctcagcacctgaact
cctgggggaccgtcagttccctcccccacccaaaggacaccctcatgtcccgagccctgaggtcacatgcgtgg
10 tggggacgtgagccacgaagaccctgaggtcaagtcaactggtagtgcggacggcgtggaggtcataatgcacagacaaagc
cgcggaggaggcagttacaacacgcacgtaccgtgtgtcagcgtccatccggcgtggactggctgaatggcaaggag
tacaatgtcaaggtcctcaacaaagccctccagcccccattcggatggactgtgaccaagaaccagggtcagcgtacc
acagggttacaccctgccccatccggatggactgtgaccaagaaccagggtcagcgtaccgtggcaaggcttatecc
acggacatcgcgtggagtgggagagcaatggcagccggagaacaactacaagaccacgcctccgtctggactccgacg
15 gtccttcttccttacagcaactcaccgtggacaagagcagggtggcagcaggaaacgttctcatgtccgtatgcac
gtctgcacaaccactacacgcagaagagcctccctgtccggtaaatgtatcaga

Amino acid sequence:

20 MDFQVQIFSFLISAVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGGTYSLTISRVEAEDAATYYCQQWS
FNPPPTFGAGTKLEKDGGSGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVIDFCARVVYNSNYWYFDVWGTITVTVSSDQEPEKSSDK
THTSPPSSAPELLGGPSVFLFPKPKDTLMISRTPEVTCVVVDVSHEPVEKFNWYV
25 DGVEVHNAKTPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPN
NYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLS
PGK.

30

79. 2H7 scFv VH L11S (CSS-S)H WCH2 WCH3

Nucleotide sequence:

35 aagcttgcgccatggatttcaagtgcagatttcagttccgtctaattcgttgcataatgcacaggacaaaatgtctc
cccgatctccagcaatctgtctgcattcccgaggagaaggctacaatgtactgcaggccatgttgcacatgcact
ggtaccagcagaaggccaggatcccccacccctggatttatgcggcatccaacctggctctggagtcctgctcgctcagtg
gcagtggctggaccccttactctcacaatcagcagatggaggctgaagatgtccacttattactgcacgcagtcggagtt
taacccacccacgttggctggaccaagctggagctgaaagatggcggtggctggcgggtggatctggaggaggt
ggagctcctaggcttatctacagcagtcggggctgagtcggtagggcctggcctcagtgaaagatgtccatgcaggcttcgc
tacacatttaccagttacaatatgcactggtaaagcagacaccatggcctggaaatggatggagctattatccaggaaat
40 ggtgatacttcataatcagaagttcaaggccacactgactgttagacaatccctcagcacatgcacttcag
cagcctgacatctgaagactctgcggctattctgtcaagatgggtactatagtaacttactgttacttcgatgtctgggcac
agggaccacggtcaccgtctctgtcaggagccaaatctgtgacaaaactcacatccccaccgtcctcagcacctgaact
cctgggggaccgtcagttccctcccccacccaaaggacaccctcatgtcccgagccctgaggtcacatgcgtgg
tggggacgtgagccacgaagaccctgaggtcaagtcaactggtagtgcggacggcgtggaggtcataatgcacagacaaagc
45 cggggaggaggcagttacaacacgcacgtaccgtgtgtcagcgtccatccggcgtggactggctgaatggcaaggag
tacaatgtcaaggtcctcaacaaagccctccagcccccattcggatggactgtgaccaagaaccagggtcagcctgcgtgg
acagggttacaccctgccccatccggatggactgtgaccaagaaccagggtcagcctgcgtggcaaggcttata
acggacatcgcgtggagtgggagagcaatggcagccggagaacaactacaagaccacgcctccgtctggactccgacg
50 gtccttcttccttacagcaactcaccgtggacaagagcagggtggcagcaggaaacgttctcatgtccgtatgcac
gtctgcacaaccactacacgcagaagagcctccctgtccggtaaatgtatcaga